VOL. XX. No. 4. OCTOBER, 1910.



# THE MONIST

A Quarterly Magazine

Devoted to the Philosophy of Science

Founded by E. C. HEGELER.

## CONTENTS:



---

CHICAGO

THE OPEN COURT PUBLISHING CO.

Price, 60 cents; Yearly, $2.00

LONDON: Kegan Paul, Trench, Trübner & Co., Ltd.

In England and U. P. U., half a crown; Yearly, 9s 6d.

Entered as Second-Class Matter Oct. 10, 1890, at the Post Office at Chicago, Ill., under Act of March 3, 1879.

VOL. XX. OCTOBER, 1910. NO. 4.

# THE MONIST

## TRUTH.

### THE WORD "TRUTH" IN EUROPEAN LANGUAGES.

THE words *true, truth, troth, trust, truster, trustee, truce,* etc., are derived from an old Teutonic root which appears also in the modern German words *treu,* "faithful," *trauen,* "to have confidence," and also *Trost,* which means originally "rest" or "assurance," then "reliance," and finally "comfort" or "solace."

The noun *truth* is formed from *true* by the ending *th* in the same way as *wealth* from *weal* (prosperity), *health* from *hale* (sound), *dearth* from *dear* (scarce), and *hearth* from a word now lost corresponding to the Gothic *hauri* and Icelandic *hyrr* meaning "coal," a "cinder" or "ember."

By "truth" we generally understand the trustworthiness or reliability of an idea. According to the etymology of the word, truth is that which endures, that which continues to remain the same, that which stands the test and is not subject to change.

The German words *wahr* and *Wahrheit* are most probably derived from the root WAS, the infinitive of which in Old German is *wesen,* "to be," "to exist." Derivatives of this root are preserved in the English "was" and "were." The German word *wahr* must originally have denoted ac-

tual existence, and then acquired the meaning "true" in the sense that what we think is, actually exists.

The English word "worth" as well as its German equivalent *Wert* are probably connected with the same root from which *wahr,* "true," is derived. It means originally the quality of having substance or reality, that which is *wahr* or truly being; that which is reliable, because it endures.

The German word *wahr* has no direct connection with the Latin *verus*; at any rate it is not derived from it, for it existed among the Saxons as well as the Germans and other Germanic nations before Roman civilization began to influence northern Europe; but it is not impossible that *verus* is derived from the same root, WAS, which is common to all the Indo-Germanic nations.

In Anglo-Saxon, the word *war,* "true," meant the same as the German *wahr,* but it was replaced in English by "true," the German *treu,* meaning faithful. Judging from the Gothic word *tuzwers,* "doubtful," the Goths must also have had the root of the German *wahr*; it was presumably pronounced *wers,* but at the time of Ulfila the term *sunjis* ("true," the root of which is SA or AS, as it appears, for instance, in the German *sein* and in *asmi,* εἰμι, *sum* and *am*) was used in its stead.

If we attempt to reproduce the Gothic *sunjis* in modern German, we might render it *seinig,* analogous to an English formation, *be-ish.*

The German affirmation *ja,* "yes," and its English equivalent *yea* mean "it is true" and are derived from a root which appears in the Old-High-German verb *jēhan,* "to own, to confess, to profess." In Old-Saxon it reads *ja* and in Anglo-Saxon *geâ* or*gê-swâ,* the latter being an amplification meaning "yea thus" or "yea so," and was contracted into *gêse,* from which the modern word *yes* is derived.

The root of *jēhan* appears also in the German word *Beichte,* "confession," which is derived from the verb *be-jēhan,* or later *be-ichten.*

How far *ja* is connected with *je* (Old-High-German *ie*) is doubtful.

The word *ie* or *iwe* (English *ever*) is preserved in the German *je* and *ewig,* "eternal." The same root has produced the German *Ehe,* "marriage," denoting the alliance between husband and wife destined to last forever. In Greek the word **αἴων**, an unlimited long period, is etymologically the same as the German *Ehe.* The *h* in *Ehe* corresponds to a digamma (pronounced *v*) in the old Greek *aivon* as well as the German *ewig,* but it disappears in the Attic pronunciation of the Greek **αἰων**, as well as in its English derivative "eon."

The German *wahren,* "to guard" and *währen* (the latter etymologically the same as the English "wear" in the sense "to last," "to endure") are also kin to *wahr,* but here the idea of existence has been changed to that of persistence.

How far, and whether at all, the old Slovenian word *vera,* "faith," and the Irish *fir,* "truth," are etymologically related to the Teutonic word *war,* "true," or the root WAS, "real," is doubtful.

In Greek the word **ἀλήθεια** means that which is not hidden, that which can be beheld unconcealed, that which is not masked, or does not put on a false show.

In the Slavic languages truth is called *pravda* (in Polish spelled *prawda*) and in Croatia it is called *istina.*

The Hungarian word for truth is *igaz,* and from this same root are derived a number of other words, such as *igazsag,* literally "truthhood," denoting "justice," *igeret,* "promise," and *igen,* "yes" or "yea."

In addition there exists a special word *ige* which means truth in a religious sense and denotes especially the scrip-

tures, or the Bible, or the word of God. Since Hungarian is a non-European language, the roots of which are different from any Aryan speech, it is difficult to trace the original meaning of these words, but the several derivatives prove that the original meaning can not be much different from their English equivalents, true, truth, troth, and yea or yes, "it is true," as an affirmation.

### THE HEBREW, THE EGYPTIAN AND THE CHINESE NOTIONS OF TRUTH.

In Hebrew there are several words denoting truth, but all of them denote what will last or will stand inquiry. The words *'omen* as well as *emeth* are derived from verbal stems which mean "to be firm."[1] The former verb *aman* has entered into the New Testament and thence into all modern languages in the shape of *Amen*, "verily," which literally means "it stands firm," or "it is true."

*Netsakh*[2] means originally glory, brightness, then lastingness and truth, while the affirmation *yetseb* is used to denote that which will stand in court, being derived from *yatzab*.[3]

The Chaldee word *Qeshot*,[4] "truth," is derived from *Qashat*, "to divide evenly," "to make equal," "to measure off rightly," and is connected with words meaning a pair of balances and weights. The underlying idea of the conception is the determination of exact measure.

* * *

In Egyptian truth is called *Ma'at*, represented as a goddess with an ostrich feather, a figure which is different from all other gods in so far as she plays no part in mythology, except that she is called the daughter of Ra, the Sun-

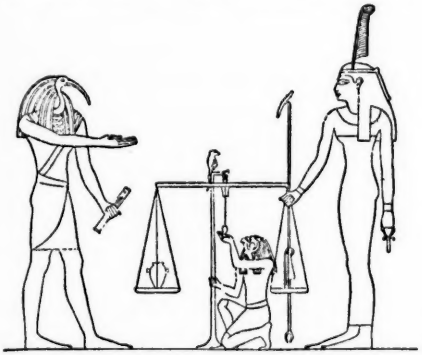
[1] The word אֹמֶן is derived from אמן, "to be firm," and אֱמֶת from אמת, "to be stable."

[2] Two forms, נֶצַח and נָצַח, are in use, both being derived from נצח.

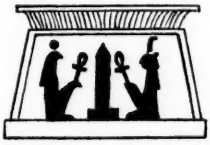
[3] יָצָב from יצב, "to stand in court."

[4] מִשְׁוָט, truth, and קְשִׁיטָה, weight, are both derived from משט.

god, and is commissioned with weighing the heart of the soul in the underworld before the throne of Osiris. Otherwise she is the personification of truth and right, but the



HORUS WEIGHING THE HEART IN THE UNDERWORLD.*



ANCIENT BREASTPLATE REFERRED TO IN TEXT.

A GOVERNOR OF RAMESES IX.
From Erman, *Life in Ancient Egypt.*

THE GODDESS MAAT.
From Budge's *Mummy*, p. 29.

abstract idea of the term has been and has always remained uppermost in the minds of the Egyptian people. She is

*In the scale is the hieroglyphic for truth.

also spoken of in the dual form *ma'ati*, "the two truths," as the goddess who attends to both punishments and rewards.

The goddess Ma'at is repeatedly mentioned in the oldest extant Egyptian inscription which praises King Unas because "he loved truth (*maa*)... and the double truth (*maati*) has heard him...the double truth has given command to let him pass through the realm of Seb, and to make him rise at his pleasure....And Unas cometh forth on this day as the fruit of the truth (*maa*) of a living soul ...Unas cometh forth according to the truth, which brings him his desire."

The adjective *maa* means "straight" or "level," then "right" or "due," and also "genuine" or "real."

The emblem of Ma'at is the ostrich feather. As a goddess Ma'at is the patron of justice, and it is reported that the chief judge wore her picture on a chain upon his breast. The breastplate here reproduced shows Ma'at and the hawkheaded Ra, seated on either side of an obelisk. The picture of a governor under Rameses IX shows him in his capacity as a judge, holding the ostrich feather of truth in his left hand.

* * *

The Chinese word for "truth" is 眞 *chan*, which is a compound of the two characters 人 *jan*, "man," and 直 *chih*, "upright." The character *jan* appears in the two strokes underneath the word *chan*. The word "upright" is a compound of three radicals, which are 十 *shih*, "ten," 目 "eye," and L an abbreviation of 隱 *yin*, which means "hidden." The whole compound character is explained in the Chinese dictionaries as "ten eyes see the hidden." The word "ten" also means "perfect" or "complete," and so it might as well mean, "a perfect vision of the hidden."[5]

[5] The character *chan*, "truth," is found in Chinese dictionaries under the radical No. 109, meaning "eye," as accompanied by five strokes.

As the character *chan,* "truth," now reads, the radical *shih,* "ten," on top of the old way of writing *chan,* is replaced by the radical No. 21, 匕 *pi,* "ladle," in the sense "to compare" or "to change," and in this form the word is explained according to the Taoist notion as referring to the changes which spiritual beings or fairies undergo. In explanation of this view we must state that under the influence of mysticism the "true man" has come to denote first a purely spiritual person, then a magician who can change his shape at will.

The adjective "truthful" in Chinese is 信 *sin,* and the character consists of 人 "man" (in compounds on the left side written thus 亻), and the word 言 *yen,* the latter being composed of 口 "mouth" and four strokes above it, meaning "what comes out of the mouth." The whole character "truthful" accordingly depicts "a man standing by his word," a pictorial description than which certainly no better could be invented.

### A DESCRIPTION OF THE NATURE OF TRUTH.

Before we enter into further explanations of the significance of truth we will hear what philosophers have said about it, how they define it and what they think about it.

But since many of their statements are vague and unclear, it will render a review of their definitions easier if we know the state of things which suggested the coinage of the word. It is advisable for this reason that we understand exactly why and how the word originated and what we ourselves mean by truth. If we are clear ourselves we shall the quicker see what our predecessors intended to say even when they missed the point or could not find the right expression.

The need of communicating our intentions, our requests and our ideas concerning things has produced language; but incidentally while this purpose is fulfilled, lan-

guage accomplishes a task which grows in importance; it clarifies the mind, it begets abstract ideas and thereby produces that order in the methods of thought which is called reason. The speaking animal becomes a rational being.

All speech is representative. Every word stands for something, and every sentence either is itself a declaration or implies one. Every statement refers to some object of thought which may be anything or of any kind and need not be a bodily and concrete object. It may be a mere relation and even, as in mathematics, a purely mental conception, or the product of a mental function.

A declaration may describe its object of thought correctly or incorrectly, appropriately or inappropriately, with exactness or inadequately. In the former case it is called true; in the latter false, erroneous, untrue or incomplete.

When we ask what truth means, we must first bear in mind that truth always refers to a statement made concerning some fact. If the statement describes the fact as it is, it is called "true." We do not speak of facts as being true; facts are either "real" or "unreal." The existence of the chair, the table, the pen is not called "true," but the statement that the chair on which I sit, or the table on which I write, has four legs, is either "true" or "untrue." A statement, as a rule, can be verified. We can count the legs of the table, and if we count to four we say, "It is true that the table has four legs."

Truth accordingly consists in a relation. There is a subjective statement and an objective condition of things. Truth means that the former properly describes or represents the latter. If I investigate and find my expectations fulfilled, I call the statement true, and this correspondence, this congruence of thought and thing, is called truth.

## THE PHILOSOPHERS OF CLASSICAL ANTIQUITY.

A review of philosophical definitions of truth must naturally be very incomplete, because not every philosopher has left a succinct exposition of the subject, and what we have to offer here is practically a mere compilation of extracts made from the history of philosophy, having no other merit than that they furnish a brief synopsis of various views and explanations.

We will introduce our collection with a quotation from the literature of the Old Testament Apocrypha, which is not a definition but an appreciation of truth. It is not philosophical but religious and reflects in general and emotional language the reverence in which truth is held by mankind. We read in 1 Esdras, iv. 38-40:

"As for the truth, it endureth, and is always strong; it liveth and conquereth for evermore.

"With her there is no accepting of persons or rewards;[6] but she doeth the things that are just, and refraineth from all unjust and wicked things; and all men do well like of her works.

"Neither in her judgment is any unrighteousness; and she is the strength, kingdom, power, and majesty of all ages. Blessed be the God of truth."

By turning from the Jewish literature to Greek philosophy we must regret the absence of any definition of truth among the oldest thinkers, since, with the exception of a few extracts, quotations and general characterizations, their writings have been lost.

The oldest Greek philosopher whose definition of truth has been preserved is Parmenides of Elea. He was born about 515 B. C., flourished in the beginning of the fifth century and must have been advanced in years in the time of Socrates. He was the philosopher of pure being to whom reality appeared as merely phenomenal, and ac-

[6] In the place of "rewards," the word "privileges" would perhaps better convey the meaning of the text.

cording to him truth consists in the knowledge that being is and not-being cannot be. The error accordingly arises through the belief that not-being exists. This view of Parmenides is preserved in a passage repeatedly quoted, which according to Proclus in his commentary on Plato's Timaeus (II, 105 b) reads thus:[7]

"Listen and I will instruct thee—and thou, when thou hearest, shalt ponder,
One path is: That Being doth be, and Non-Being is not;
This is the way of conviction, for Truth follows hard in her footsteps.
The other path is: That Being is not, and Non-Being must be;
This one, I tell thee in truth, is an all-incredible pathway.
For thou never canst know what is not (for none can conceive it)
Nor canst thou give it expression, for one thing are Thinking and Being."

We must remember that Parmenides identified pure existence with the absolute conception of pure being, thus identifying existence with pure thought. Plotinus quotes from him, "For one thing are thinking and being," which is thought to belong at the end of the passage just quoted, and has therefore been included with it.

Plato was greatly influenced by Parmenides and reconciled his views with the philosophy of Heraclitus, whose system is characterized by the phrase *πάντα ῥεῖ*, "Everything is in a flux." Plato's view of truth is condensed by Ueberweg as follows:[8]

"Plato opens the exposition of his physics in the *Tim.* (p. 28 *et seq.*) with the affirmation that since the world bears the form of γένεσις (development, becoming) and not that of true being (οὐσία) nothing absolutely certain can be laid down in this field of investigation, but only what is probable (εἰκότες μῦθοι). Our knowledge of nature bears not the characters of science (ἐπιστήμη) or of the

[7] The passage as quoted here is translated from Mullach's *Fragmenta Philosophorum Graecorum* by Thomas Davidson in the *Journal of Speculative Philosophy*, Vol. IV, No. 1 (January, 1870).

[8] *History of Philosophy*, New York, Scribners, 1903, I, 125.

knowledge of truth (*ἀλήθεια*), but those of belief (*πίστις*). Plato says (*Tim.*, p. 29 c): "What being is to becoming, that is truth to faith" (*ὅ τι περ πρὸς γένεσιν οὐσία, τοῦτο πρὸς πίστιν ἀλήθεια*). What Plato says in the *Phaedo*, p. 114 d, explains his idea of the probable: 'Firmly to assert that this is exactly as I have expressed it, befits not a man of intelligence; yet that it is either so or something like it (*ὅτι ἢ ταῦτ' ἐστιν ἢ τοιαῦτ' ἄττα*) must certainly be assumed.'"

Aristotle's definition of truth commends itself more than Plato's to the scientist, and has been summed up by Ueberweg thus (*op. cit.*, I, 152):

"Truth in a logical judgment is the correspondence of the combination of mental representations with a combination of things, or (in the case of the negative judgment) the correspondence of a separation of representations in the mind with a separation of things; falsity in judgments is the variation of the ideal combination or separation from the real relation of the things to which the judgments relate."

Further down Ueberweg says concerning Aristotle:

"Truth in knowledge is the agreement of knowledge with *reality* (*Categ.*, c. 12: *τῷ γὰρ εἶναι τὸ πρᾶγμα ἢ μὴ ἀληθὴς ὁ λόγος ἢ ψευδὴς λέγεται*). This dictum is thus particularized, in *Met.*, IV, 7, with reference to the various possible cases: 'Affirming non-existence of the existent, or existence of the non-existent, is falsehood; but affirming existence of the existent, and non-existence of the non-existent, is truth.'"

The Stoics have devoted themselves to explaining the method by which truth becomes known, or, as we would now say, they lay much stress on epistemology or the theory of cognition, better expressed by the Saxon formation "kenlore." According to them all knowledge arises from sense perception, and the fundamental criterion of truth is found in the distinctness with which sense perceptions are represented in the mind.

Epicurus, though very different from the Stoics in his ethics, agrees closely with their theory of cognition. His

criteria of truth are sensation and feeling. To him all sensations are true and indisputable.

Here Epicurus ought to have said that sensations are the ultimate data from which we derive our knowledge, but a sensation cannot properly be called true. It is simply a fact.

That Epicurus confused truth and reality appears from his contention that no perception can be proved false (he means unreal) and that even dreams and the hallucinations of the insane are true, because they produce an impression which the non-existent could not do.

The images of past sensations are remembered, and Epicurus calls them representations. Beliefs are called true or false in so far as they are confirmed or refuted by sensations. It is noteworthy that Epicurus disregarded the value of logical syllogism because according to his view no syllogism could supply the place of direct sensation. It is interesting to note that this view is paralleled in India by the materialist school, the Charvakas or Lokayatas, who also deny that logical argument can carry conviction because they claim that the only source of information is sense-perception.

### CHRISTIANITY AND THE DOCTRINE OF TWO TRUTHS.

Augustine understands by truth the norm according to which reason argues, and he declares that it must be unchangeable (*De lib. arb.*, II, 3). To reach the unchangeable is to him the attainment of truth. He says (*De vera rel.*, 72 f):

> "If thou findest thy nature to be changeable, rise above thyself to the eternal source of the light of reason. Even if thou only knowest that thou doubtest, thou knowest what is true; but nothing is true unless truth exists. Hence it is impossible to doubt the existence of the truth itself."

Truth and existence are the same according to St.

Augustine, and he identifies them with God (*De vera rel.*, 57; *De trin.*, VIII, 3). This ultimate truth is the highest good in virtue of which all other blessings are good (*De trin.*, VIII, 4). Created things stand in a contrast to the unchangeable highest good and thus indirectly the mutability of created things reminds us of the immutability of truth.

Thomas Aquinas defines truth as *adaequatio intellectus et rei,* which is best translated as "agreement of thought and thing."

During the Middle Ages the church claimed the authority of a special divine revelation as the source of truth, its truth, the truth of ecclesiastical dogmas.

In Spain where in a Mohammedan country a high civilization had developed we find a distinction made between esoteric and exoteric truth. Revealed religion was the truth made palatable to the masses, it was exoteric, while esoteric truth was the special privilege of the thinker, and it was not deemed necessary for the two to agree. In a similar way and not without the influence of Averroës and Maimonides the conflict between scientific truth and religious truth led to the theory of the two truths, theological and philosophical, and it was assumed that what is true in theology need not be true in philosophy and *vice versa.* Prof. M. Maywald has made a special study of this strange aberration in his book *Die Lehre von der zweifachen Wahrheit,* Berlin, 1871, and Windelband condenses this subject in his *History of Philosophy* (pp. 320-321) as follows:

"If, by theology, we understand the exposition of the positive doctrine of religion, arranged and defended according to the formal laws of science, i. e., Aristotelian logic,—and this was the form which the relation of theology to religion had taken in the West as in the East,—it follows that something may be true theologically which is not true philosophically, and *vice versa.* Thus is explained

that doctrine of the twofold truth, theological and philosophical, which went through the entire Middle Ages, although we cannot exactly fix the authorship of this formula. It is the adequate expression of the mental state necessarily brought about by the opposition of the two authorities under which the Middle Ages stood, viz., Hellenistic science and religious tradition; and while at a later time it often served to protect scientific theories from the persecution of the church, it was for the most part, even in these cases, the honest expression of the inner discord in which just the most important minds of the age found themselves.

"The science of the Christian peoples accepted this antithesis, and while the doctrine of the twofold truth was expressly proclaimed by bold dialecticians such as Simon of Tournay, or John of Brescia, and was all the more rigidly condemned by the power of the church, the leading minds could not evade the fact that philosophy, as it had been developed under the influence of Aristotle and the Arabians, was, and must remain, in its inner nature, alien to precisely those doctrines of the Christian religion which were specific and distinctive."

The doctrine of the twofold truth found its most energetic champion in the French savant Pierre Bayle. Albertus Magnus had distinguished between natural and revealed religion, but he clung to the idea that there might be no contradiction between the two. He tried to show that what science and philosophy teach holds good also in theology, but that certain realms inaccessible to natural insight (*lumen naturale*) could be entered only through the mysteries of revelation. Pierre Bayle, however, went so far as to declare that all doctrines of the church were positively contrary to reason, indeed that they were absurd from the standpoint of science. He thus exemplified the sentence *credo quia absurdum.* But the doctrine of the double truth proved a two-edged sword and in the long run served more to weaken than to establish confidence in the traditional religious belief.

The church itself with its usual instinctive foresight would not brook the doctrines of the twofold truth, and the

Lateran Council of 1512 condemned this distinction and pronounced everything false which stood in contradiction to revelation.

### MODERN THINKERS.

Spinoza inserts his definition of truth among the axioms, in the sixth of which he states that "the true representation must agree with the object represented."

Hume is a skeptic and so has little to say about truth except that all positive attempts at stating truth are futile.

Kant, who was awakened from his dogmatic slumber by Hume's skepticism, so changed his attitude toward the data of knowledge that instead of a conception of truth he presents in his *Critique of Pure Reason* an inventory of our faculty of working out sense experience into scientific knowledge. He calls his system "critical idealism" and says that since things-in-themselves are unknowable, human knowledge is limited to phenomena. Thus it happens that reason is practically our norm of knowledge; but it may not be accidental that he has nowhere discussed the problem of truth. It is as if this problem had lost its usual significance in his philosophy, and so we find that the very caption of truth is not listed in Gustav Wegener's *Kant-Lexikon*.

Schopenhauer adopts Kant's idealism, but he repeatedly discusses the nature of truth and insists most emphatically on its consistency, saying that truth alone agrees throughout with itself and with nature while all wrong views clash internally with themselves and externally with experience. In fact experience protests step by step against errors.[9] One truth can never upset another, but all must ultimately agree because no contradiction is possible in intuition (*Anschauung*) which is their common foundation. Thus no

[9] Cf. *Grundprobe der Ethik*, 258, and *Welt als Wille und Vorstellung*, II, 114.

truth can be in fear of another. Fraud and error, however, must stand in awe of every truth. All truths form one system. They postulate and complement one another while error collides everywhere.[10] Schopenhauer distinguishes between general truths and special truths, and of these he rates general truths the higher, as gold is more valuable than silver. Gold can always be easily changed into small coin.[11]

Schopenhauer distinguishes between correct, true, real and evident, saying that concepts are correct, judgments are true, material things are real, and interrelations such as mathematical figures are evident. When he speaks of the foundation of truth as being based on intuition (*Anschauung*) he means such knowledge as is contained in geometrical and arithmetical theorems, which in Kant's terminology is called *a priori* and according to Schopenhauer is based on *Anschauung* or intuition whose truth appears or becomes evident by merely contemplating the interrelations of geometrical figures.

There are four kinds of truth according to Schopenhauer. One is purely formal or logical, referring to syllogisms and correctness of deductions; the second is empirical, referring to statements of fact; the third is transcendental where the word is used in the sense of Kant's terminology. It comprises judgments of pure mathematical and pure natural science (referring mainly to the law of causation). The fourth kind of truth is metalogical, referring to the conditions of thinking itself.

Schopenhauer's philosophy, as is well known, insists on the dominance of the will. The intellect, though really the priestess of truth, is misused by the will as his handmaid, for the will in Schopenhauer's system plays the part of the devil. But some of his successors, especially Nietz-

[10] *Panerga und Paralipomena,* II, 253, and I, 136.

[11] *P. u. P.,* II, 22.

sche, accept upon the whole the foundation of Schopenhauer's world-conception, but they deify the will and claim that the intellect ought to be secondary. Nietzsche goes so far as to deny the right of truth to exist except by the gracious permission of the will, and this same tendency to give preeminence to the will has invaded other circles, as we have seen, and has found definite expression in pragmatism. The great question remains whether or not truth is possible at all, and with this question ethics stands and falls as well as science, for if there is no standard of truth neither can there be a standard of right and wrong.

The average opinion as to the nature and function of truth among modern scientists is characterized by John Theodore Merz, who speaks as follows in his *History of European Thought in the Nineteenth Century*:[12]

"At one time—and that not very long ago—the word truth seemed to indicate to the seeker not only the right method and road for attaining knowledge, but also the end, the crown of knowledge. 'Truth, and nothing but truth,' seems still to the popular mind the right maxim for seeking knowledge—the whole truth stands before it as the unity of all knowledge, were it found. I think it is now sufficiently clear to the scientific inquirer, as well as to the philosopher, that love of truth, while it does indeed denote the moral attitude of the inquiring mind, is insufficient to define either the path or the end of knowledge. 'What is truth?' is still the unsolved question. The criteria of truth are still unsettled. It would, indeed, be a sorrowful experience, a calamity of unparalleled magnitude, if ever the moral ideas of truth and faith should disappear out of the soul of either the active worker or the inquiring thinker; but it is with these as with other treasures of our moral nature, such as goodness and holiness, beauty and poetry—our knowledge of them does not begin, nor does it increase, by definition; and though in the unthinking years of our childhood we acquire and appropriate these moral possessions through the words of our mother-tongue, they rarely gain in depth or meaning by logical distinctions which we may learn, or to which we have to submit, in later life. These do

[12] English translation, p. 29 f.

not touch the essence, though very frequently they may succeed in destroying the depth, of our convictions.

"In the place, then, of the high-sounding but indefinable search after truth, modern science has put an elaborate method of inquiry: this method has to be learned by patient practice, and not by listening to a description of it. It is laid down in the works of those modern heroes of science, from Galileo and Newton onward, who have practised it successfully, and from whose writings philosophers from Bacon to Comte and Mill have—not without misunderstanding and error—tried to extract the *rationale*."

While knowing that this is the average opinion of our scientists we must enter a vigorous protest against the proposition that "the criteria of truth are still unsettled." It is true enough that "the scientific method has to be learned by patient practice, not by listening to a description of it," but that what has been successfully practised by the heroes of science from Galileo down to Lord Kelvin, Hertz and their most recent successors, should be equivocal and doubtful is not true. The methods of an investigation of truth are not vague nor indefinite. Our scientists rely on observations unequivocal and reliable, which are made by mechanical contrivances, registry machines, instruments of precision, with photography and chemical reactions, according to circumstances. We always have a combination of sense perception, which at present is rendered more reliable by the invention of various devices, the machinery of the scientist, with the calculation of arithmetic, mathematical construction or logical argumentation. In brief, the scientific method is, as cognition has always been since the beginning of the human race, sense experience treated by the rules of reason (the purely formal sciences). Sense experience furnishes the fact in question, reason (that is, the sum total of all purely formal modes of reasoning) furnishes the method of treating the facts, of classifying and systematizing them.

## TRUTH AND MIND.

There is an unmistakable agreement among most of these different opinions as to the nature of truth. It seems that all philosophers of the world bear in mind a certain ideal and are guided by the same tendency only with more or less lucidity and with more or less depth. It is plain that truth is a relation, and it always denotes an agreement between thought as stated in a formula and the object of thought, whatever the latter may be. If this object of thought be called "thing" we can accept unhesitatingly the definition of Thomas Aquinas that truth is the agreement between thought and thing (*adaequatio intellectus et rei*); in fact this is the simplest definition, but it needs further explanation as to the nature of both thought and thing.

Truth is in thought and in thought only. There is no truth elsewhere. What is sometimes called truth ought to be called reality or existence, actuality, fact or whatever else we may call the objective meaning of a thought. There is a great difference between existence and truth. Facts (by which we mean concrete things, events or conditions that obtain independent of what anyone may think of them) are real, while truths are correct images, symbols, descriptions, or representations of such facts. The sense impressions of which a sentient being becomes conscious are not truths but facts. They are the data from which we construct our knowledge of the objective world. These sense impressions are the results of impacts made by the surrounding world upon a sentient being . Sense impressions are states of awareness which come to indicate the presence of the causes producing them, and thus these sense impressions acquire meaning, or, as we might say, are worked out into sense perceptions. The external impacts are physical facts—ether waves that strike the eye, air

waves that strike the ear, mechanical impressions that affect the skin, etc. Sense impressions are psychical, they are states of feelings, and sense perceptions are mental.

As soon as a sense perception begins to stand for its external cause and is interpreted to picture, delineate or characterize an outside fact, we have to deal with mind, and mind is the domain of truth. While a sense impression is a fact, a sense perception may be true or false.

Sense impressions work with the infallibility of natural laws, and they are nature's work over which we have no control; but sense perceptions are our own doing. They are the result of a reaction which takes place in us in response to a number of sense impressions. Every sense perception, even in its simplest form, is an unconscious judgment. It presupposes that a sense impression of the same kind has been received and has left a trace in the sentient substance. If then a new sense impression of the same kind is made, it fits into the path left by the trace of the former sense impression and revives it. Thus we have two feelings, that of the new sense impression and the revived memory of the former sense impression, but in addition there originates another and a new feeling by the fusion of the two which is the perception of the two being of the same kind. The analogy to a logical syllogism is obvious. The memory of the preceding impression represents the major premise, under which the new sense impression is subsumed as the minor premise, and the feeling that the impression fits is tantamount to the conclusion that the subjects of the premises belong to the same category.

So far as prior and subsequent sense impressions tally correctly, they are appropriately called true, and the truth consists in the correct subsumption of what belongs in the same class. Thus truth in its simplest shape is the fitting of a certain form of feeling in its proper place, or by impli-

cation the correctness of the unconscious judgment that the new sense impression is the same in kind as the preceding one and indicates the presence of the same cause.

Truth and mind are twins, and truth is co-existent with mind. When sense impressions acquire meaning, when they develop into perceptions, mind originates and the origin of mind denotes the birth of truth, and also of the possibility of error.

### SENSE PERCEPTIONS AND HALLUCINATIONS.

The formation of sense perceptions is the beginning of mind, but by the side of sense perceptions there are hallucinations. Does not their mere existence obviously invalidate the character of sense perceptions, especially their reliability, and does it not thereby throw suspicion upon truth?

We grant the occurrence of hallucinations, but their prevalence no more invalidates the reliability of sense perceptions than the prevalence of error invalidates or renders doubtful the character of truth. We must only bear in mind that with the appearance of truth there necessarily rises the possibility of error, and this happens at the very beginning of the origin of mind. In other words, as soon as sense impressions change into sense-perceptions there appears the possibility of mistakes. If a sense impression receives a wrong interpretation it is called an hallucination. Here is an instance.

The eye of a sentient being gazes fixedly at a red figure on a white sheet of paper and this red spot on the retina is rightly conceived and interpreted by the resulting sense perception. Now the paper is withdrawn, but the image persists, except that in place of the red figure a blue spot of the same outline appears in view, and this seems almost as tangible and real as was the red figure. We call it the after-image of the red figure, and its nature is suffi-

ciently explained in the physiology of optics. This after-image is as truly a sensation and it is as real as is the original sense impression, and if we interpret it rightly to be an after-image we cannot speak of it as an hallucination. But suppose the eye were part of the organism of an unsophisticated person who knows nothing about sense illusions, the after-image would naturally be interpreted to indicate the presence of a blue figure, and this wrong interpretation would be called an hallucination.

Hallucinations accordingly are sensations produced by internal causes which are wrongly interpreted to be of external origin. There may be hallucinations of all the senses —even tactual and gustatory, but the auditory hallucinations caused by some internal disturbance of the ear and also of the center of hearing are the most common. Next to them in frequency are visions which are the hallucinations of the sense of sight, frequently caused by disturbances in the eye, specks in the circulating fluids of the outer eye or on the retina, but they are sometimes also caused by an abnormal excitation of the cerebral center of vision.

The sensory part of hallucinations is an actual fact and is as real as any sense impression; the fault of hallucinations lies in the wrong interpretation which is superadded by the mind. Therefore, it has been rightly remarked, it is wrong to speak of sense illusions, for in these so-called sense illusions the senses remain reliable, and it is the mind which errs. Sense illusions are instances of such circumstances as are apt to mislead our judgment, but they are really mental mistakes. They are in the domain of sense perception what in the realm of our intellectual activity is called error,—a failure to attain the truth.

The field of hallucinations is wide but we need not enter into further details. We will only say that dreams are natural occurrences, and we may call them hallucinations experienced in sleep or in any subconscious state in which

the normal waking consciousness is temporarily obliterated. The sensory experience of dreams is as real or at least may be as real as the sense impressions of a normal life, and a scientifically educated man knows them to be dreams. But if a nervous patient or the untrained Indian assumes dreams to be realities, he falls into an error, and then his dreams—especially if they occur in a half awake state of mind which sometimes may happen—become hallucinations.

## UNIVERSALS AND THEIR CORRELATES.

Thus we see that the foundations of truth are laid by nature herself in accordance with natural law and with the same precision as that which originates in a machine by mechanical necessity. This mechanical necessity is possible only on the supposition that the world is law-ordained, that the beams of light are such and always such, that the same causes under the same conditions always produce the same results, and that this world is a world of uniformities, not a sporadic chaos. If the world were a sporadic chaos, mind could not have originated even in its most primitive beginning. In fact mind is nothing but the systematic upbuilding of the lawdom (*Gesetzmässigkeit*) that prevails in the world, and we may say that this lawdom is the ultimate basis of truth; it is the condition which makes truth possible.

Facts appear to be chaotic. Not one is exactly like any other. All the various facts that appear in existence present a kaleidoscopic irregularity which in itself appears to be a hopelessly confused tangle. If mind did not originate, the world would remain a meaningless play of blind forces. But the very origin of mind proves that law rules in the world of facts, and all these innumerable items of material existence and this display of unlimited forces is

subject to rule, which makes it possible to formulate all occurrences into general formulas.

There has been much discussion in the history of philosophy about universals, and two contradictory views have been taken of this much mooted subject. There are on the one side thinkers who see in universals the only true reality, the true being or ὄντως ὄν, and on the other side observers of nature who look upon them as mere generalizations which have no true existence and have been invented merely for the purpose of classifying the real things. Both views are right, but both are one-sided, and much depends upon the meaning of the word "real." If it means "thingish," as the word implies, universals are nonentities, for they are not things, nor objects, nor concrete material bodies, they cannot be touched by hands or perceived by any one of the senses.

If concrete actuality of existence is the meaning of "real" we must absolutely grant that universals do not possess reality. From this standpoint the nominalists speak of universals as *flatus vocis,* as words, and more modern followers of this line of thought treat them as devices for thinking the realities of life. Materially considered universals are non-existent. They are products of the scientist's imagination and neither telescopes nor microscopes, no chemist's crucible nor physicist's scales will ever discover the slightest trace of the actual existence of universals, natural laws, formulas, Platonic Ideas, or anything that belongs to that class.

Now let us consider the opposite view. Does the nominalist school or any one of their type really mean to say that universals are mere *flatus vocis,* mere generalizations, mere contrivances to think the world more easily? Many men of this type actually say so, but do they truly mean it? Would they really be prepared to say that universals possess no objective meaning, that there is nothing corre-

sponding to them in the actual world? We have granted that no actual things, no material entities correspond to them. They are not divinities presiding over certain departments of nature as represented in the mythology of the religions of the past, nor are they metaphysical essences which somehow mysteriously underlie the phenomena of nature. Nevertheless there is no one who would be prepared to deny that there are certain somethings corresponding to them in the actual world, and that these somethings are the very factors which shape the world. These somethings are not of a material nature, nor are they energies; they are of a purely formal nature, they are relations, shapes, arrangements of parts in one way or another. Yet these purely formal arrangements are the essential conditions of the world of material actuality which determine new formations, and so we cannot say that in every respect they are nonentities.

It is obvious that reality or thingishness and actuality, which means that the material things act, that they do something, that they move about, that there is an active play of forces summarized under the term of energy, are not the whole of existence. There is some additional feature which is non-material and has nothing to do with energy. It is the shape, the interrelation, the form, the direction, the arrangement in which either forces or material particles are combined, and this interrelational something is the true factor that moulds the world and is the reason why this enormous congeries of atoms is not a chaos but a law-ordained cosmos.

We must not overlook the fact that in addition to form there is another non-material element ensouling the world, and this is that indescribable something which develops into human consciousness. It is feeling, the peculiar characteristic of which appears in awareness. For reasons into which we need not enter here, we assume that the

whole world is aglow with a potentiality of feeling, which in a philosophical term we may call subjectivity. Subjectivity emerges from purely physical conditions and finally develops in the course of a long evolution into the thinking subject. But even this psychic element of subjectivity would have remained forever a scintillating chaos of subconscious feelings if its elements had not been arranged into an orderly whole according to the laws of pure form. It is the orderly interrelation of elementary subjectivity which in a nervous system makes feeling possible; it is further the proper classification of feelings of the same form which renders feelings representative; and finally it produces reason in the natural course of the evolution of mentality.

The significance of interrelations, of the mode or arrangement, of form, has been strangely overlooked in philosophy, while it has produced in minds of a mystic turn fantastic views as to the nature of spirit, soul and God. Opponents of mysticism have always been inclined to deny the existence of anything spiritual. They try to do without believing in spirit, soul, or God, and certainly they are right in denying the mythology attached to these notions. Nevertheless the facts remain, and the facts which produce these notions are explicable by the significance of relations and forms, and though the purely formal laws as laws have no objective existence, there are purely formal relations which are of utmost importance, and though they are not real in the literal sense of reality, though they are not thingish, they are not for that reason negligible quantities, for they are the most essential feature of all existence. In fact all comprehension, all cognition, all intellectual activity becomes possible only through them. When we speak of reality and actuality, we refer merely to statements of fact. These names—reality and actuality, in other words, matter and energy—contain nothing that can be

understood or would become in any way an object of comprehension. All comprehension consists in tracing transformations of matter or the changes of the forms of energy. Matter and energy simply represent the "that" of existence, not the why or the wherefore.

Accordingly we come to the conclusion that there are objective correlates of our subjective thoughts, of universals, of the laws of nature, and also of the unities of parts which combine into things. Though they are neither concrete objects nor metaphysical essences, they possess an objective significance. They are traceable in the uniformities of nature and the laws in which we summarize these uniformities are true and reliable descriptions of definite features of the constitution of the world. We call these descriptions, these laws of nature, these generalized statements of fact, truths, and the instinctive reverence which men at large have for these truths is well grounded.

### THE ONENESS OF ALL TRUTHS.

Experience has taught us to look upon all truths as one great system of more or less general uniformities, which are co-, sub- and super-ordinated in such a way that all of them complement one another and that the more general truths comprise and thereby explain the more particular ones; while the latter are specifications of the former. At any rate we expect that no two truths shall contradict one another. They form contrasts but never come in conflict with each other. The more they stand in contrast the more they are supplementary. This leads to the assumption of the unison, the harmoniousness, the consistency, of all truths. To state the case from the opposite point of view, we assume *a priori* that there cannot be any contradiction in truth, and so we try to harmonize all contrasts that might occur in the field of our observation.

The *a priori* assumption of the unity of all truth which

finally abuts in the theory of the oneness and consistency of all existence, called monism, is as a principle of thinking ultimately based in the systematic unity of our mind. The human mind has been built up during the course of its development as a collection of uniformities and these uniformities have classified themselves in proper order according to their sameness, similarity and kinship, so that the whole constitutes a system, and this system represents the prototype of logic. The rules of logic have been deduced from it, and in this sense the human mind is predestined to produce in its further development certain ideas which such philosophers as Leibnitz call "innate."

The human mind has reached that point of mental development in which a sentient being can designate by name the several co-, sub- and superordinated classes and become conscious of their interrelation. The animal mind cannot do so and yet it acts instinctively as if it were possessed of logic. The reason is that its composite memory images are logically arranged and operate like a living machine in a perfectly logical order. Through the instrumentality of language this interrelation can be objectified in terms of abstract thought and presented in systematic form. This system of interrelations becomes a conscious faculty of thought, called reason, which is used as a method for an orderly arrangement of ideas. In its highest perfection the application of this method is called science.

Reason enables man to see in every single occurrence an instance of a general rule, and if general rules describe real uniformities, if they possess correlates in the objective world, we call them truths.

We understand now that the domain of truth and the realm of the mind are coextensive, and mind is practically nothing but the embodiment of the most common truths of the world order, the logic of which in its systematized form we call reason.

We will here forestall a common error frequently committed by beginners and would-be philosophers, which is this, that the most general truths ought to contain the key to all the riddles of the world. In a certain sense this is true enough because an important part of explanation consists in subsuming a certain set of experiences under its proper caption, but all explanations presuppose also a knowledge of the reason why in specific cases a general rule will produce specific results. The power of generalization is the first development of mentality, the power of discrimination is its more subtle and also more difficult correlate. Those who praise a man for his power of generalization, forget that the savage, as well as the superficial investigator, is great in generalizing all things, but that he is weak in making the necessary discriminations. In fact, wrong generalizations are a common source of many errors, and no scientist can attain distinction unless he is keen in discrimination.

Truths are discovered, they are not invented. Though truths belong to the mind and exist only in the mind in the thinking subject, they have an objective significance and describe conditions which obtain somewhere or somehow independent of the mind.

When we say truths are discovered we mean that they cannot be different, and it is not in our power to shape them as we please. They are predetermined and this again implies that in some form or other they exist as potentialities. At the same time the truths which are formulas representing laws of nature are potent factors of reality, and these prototypes of our truths we will call verities. While the verities in their totality as the sum total of the determinants of the world order correspond to God the Creator or God the Father in the Christian doctrine of the Trinity, a perfect system of all the truths would correspond to God the Son, truths being incarnations of the verities. In addition

to the contrast between verities and truths, there is a middle ground composed of those ideas which tend to set the world in harmony with the cosmic order and these are called ideals. These ideals in so far as they pursue the right tendency represent the third person of the Trinity, the Holy Ghost.

Truths are subjective statements, but the reason why they are truths and deserve this high name is their agreement with their objective correlates, and it is noteworthy that these objective correlates are not concrete things but features of things, relations, proportions of interdependence, and other items or events determined by definite causes such as can be subsumed under general formulas. These objective correlates of truth are not concrete things, nor divinities, nor metaphysical essences; the formulas are mere generalizations, and what corresponds to them are generalities of existence which however are not nonentities. They are not material, not concrete, they are interrelations and thus belong to the domain of pure forms. A comprehension of them transforms sentient creatures from the state of brute animals into rational beings, and the objective counterparts, though mere interrelations of the material universe constitute the factors which determine its development and mould the inert mass of material existence into that grand law-ordained cosmos as which we comprehend the universe.

We call the formulas which correctly describe the uniformities that obtain in the universe, truths, and the same term is sometimes also applied to their objective correlates; but in order to distinguish the two we propose to call the latter "verities."

Pragmatism denies the existence of verities. It does not believe in consistency and repudiates the unity of truth. It knows only truths in the plural and these truths have

no objective significance; they are shifting and without stability.

The better we know the uniformities of nature, of social interrelations and of all the phases of life, the more profoundly conversant do we become with the constitution of the universe, or in other words, the more we know of truth the farther does our soul extend and the deeper does it fathom the world. Truths are the subjective reflection of the verities that sustain the universe. The more we know of truth, the higher shall we rise in the course of evolution, the better adapted shall we be to the conditions of life, the more powerful shall we become, the higher shall be our dignity and our worth, and the nearer shall we be unto God,—for what is God but that systematic unison of all the correlates of truth? God is the oneness of all the verities of existence.

In the same way as uniformities are not mere subjective notions, not mere names, but designate definite conditions in the objective world, the things which we meet with in experience are not mere conglomerations of parts. True things, by which we here mean objects of experience which are rightly conceived as unities are not arbitrarily so named and are not of a purely subjective nature. The unity of the thing in our conception corresponds to a unity of its parts in the objective world. It is true that what we call things are bundles of sensations, and we can analyze things into their constituent parts, but the bond of union is of deep significance. An engine is not the sum total of its parts, but the arrangement of its parts in such an interrelation that it will do work, and so we must grant that combinations, groupings, forms, interrelations produce definite and actual effects.

And what is the test that an aggregate of parts constitutes a true unity, a thing worthy of the name? A true thing must not be a mere addition of its parts, not a mere

summation of its elements, not a mechanical mixture of its ingredients, but a combination into a systematic whole which possesses an individuality of its own; and the test is that a thing which is not a mere quantitative aggregate but constitutes a higher configuration into something new is qualitatively different from its parts.

To look upon formations, the relational factors, or the purely formal aspect of things as nonentities, because they are not material items is a misconception of the paramount significance of form. We not only grant, we even insist most emphatically that there are no "things-in-themselves," no unknown or unknowable metaphysical magnitudes behind the world of experience, but for all that we recognize the objective significance of things, the efficiency of formations, of natural laws, of uniformities, and also the importance of the idea of unity, the highest realizations of which are found in organisms, plants, animals and above all in human personalities.

## CONCLUSION.

Truth has been on trial. The very backbone of truth, its consistency, the unison of all truths, has been doubted and even denied. The belief in the stability of truth, in its persistence and eternality has been denounced as a superstition.

So far truth has guided us safely from the beginning of mentality; it has endowed man with reason, it has created the sciences, inspired the inventor's imagination and is still leading mankind onward on the path of progress, but it has grown old-fashioned, and the new generation has become tired of it. The old truth is the living water which nourishes, sustains and quickens every fiber of our mental constitution, but this generation is thirsty for innovations. They are sick of the monotony of a truth that is true to itself; they hanker for a truth that is variegated,

fickle, multi-significant. So they leave this venerable ideal and look upon it as an idol. It no longer fits into the program of the "new thought" movement, and pragmatism replaces it by a more elastic kind of truth which can change with the fashions and makes it possible that we need no longer trouble about inconsistencies; for what is true to one need no longer be true to others, and the truth of to-day may be the real now, and yet it may become the error of to-morrow. The new conception of truth flatly contradicts the old rigorous and inconvenient notion according to which no two truths can be contradictory. The pluralistic truth is more accommodating, for it lets all contradictions pass and dispenses with the exacting demands of the old ideal of consistency.

This new truth conception is a fad that has its day but will pass by, for truth, the old time-worn and time-honored ideal of truth as being one and eternal, will sooner or later assert itself again. We cannot live without truth, and the new truth is a pseudo-truth that cannot help us. Those who resent truth's sternness and stability prefer to conceive truth as an errant light which points in one direction to-day and in another to-morrow. This truth is a will-o'-the-wisp which does not throw light on the path of progress but entices its followers to wend their way into the quagmire of opinions and opinionated subjectivism.

In the meantime the truth continues to encompass us, for truly all our mental life lives by the grace of truth, and in it every creature that thinks, lives and moves and has its being.

Truth, most wonderful presence in the life of man, thou encompassest our every throb of thought. Thou art God incarnate in our soul. Without thee spirituality would never have risen into being, the light of cognition would not shine, and chaotic darkness would prevail. Without

thee this world would be a congeries of dull matter and a play of blind forces void of meaning and void of purpose.

How ineffably great art thou, O Truth, and yet thou hidest thyself in things small. The senses can not find thee, for thou art not made of matter, nor dost thou consist of force. Thou residest in the meaning of fleeting sensations, and thy significance is a mere relation, a description of the uniformities of nature. And yet thou alone possessest dignity, thou alone art worthy to be called divine, and thou art the son of that All-One whom thou revealest, that One in All who sways motes and stars and moulds the destinies of all the worlds.

Thou needest no shrines and no altars and thou demandest no doxologies. There is no worship that pleaseth thee, except the worship without ritual, a surrender of error, of falsehood, of lies. He is thy true devotee who receives thee in his soul and invites thy presence to bless him.

The ideal of truth may remain neglected or misunderstood for some time, but its light will not be darkened forever. We need not fear for truth, because truth will take care of itself. The cause of truth is God's cause, for truth reflects and reveals the eternal, and the eternal is God.

EDITOR.

## THE SILENCE OF JOSEPHUS AND TACITUS.

IN the fierce attacks upon *Der vorchristliche Jesus*[1] precipitated by the adoption, accentuation, and popularization of its theses in the epoch-marking writings and lectures of Prof. Arthur Drews, conservative theologians have very properly declined to take part, thereby combining (as Bacon would say) serpentine wisdom with columbine innocence. They have clearly perceived that the movement was not directed against their position, but against the citadel of their century-old foe, who would reduce their Divinity to the ranks of men, and at least one of the very greatest of them (in a letter to the present writer) rejoiced sincerely at beholding the sudden fall of that adversary. No! It is the liberal critic, so long enthroned in the seats of learning, who has been amazed to see his central concept of the purely human Jesus put on trial for its life and more than half-convicted, and who, *ingemiscens tamquam reus*, has now for nearly a twelve-month plied an unavailing pen in passionate protest against the audacity of this "assault upon the liberal theology."

In the sallies of the besieged much weight has been laid upon profane testimonies, particularly of Josephus and Tacitus. It is Chwolson in St. Petersburg that has bared his arm of might over the Josephine section;[2] it is Von Soden in Berlin that has stressed so strongly the

[1] Giessen, Alfred Töpelmann, 1906.

[2] *Ueber die Frage ob Jesus gelebt hat.*

Tacitean chapter.[3] However much we may reverence these scholars in their cooler moments, it is not easy to take these impassioned utterances seriously. They do not indeed take each other seriously. The very section that Chwolson so eagerly defends, Von Soden declares (p. 11) to be "undoubtedly interpolation" by Christian hands. Involuntarily one recalls the famous appeal "from Philip drunk to Philip sober," and wonders how these "higher critics" (who are much higher than deep) will write tomorrow. To track down the endless inaccuracies and fallacies of their hasty superficialities would be a weary and bootless task, like chasing field-mice in autumn: stamp them out here, and lo they stir the soil yonder. In this case to be just would be cruel; we can afford to be generous and to pass over these *Flugschriften* as too flighty for detailed notice.

However, the passages in question do really call for a calm and careful and thoroughgoing treatment, such certainly as they have not yet received in this furious Battle of the Booklets, and to such an examination we now invite the patient attention of the reader.

When the liberal critic is called on to justify his dogma of the mere humanity of the Jesus, his only recourse must be to some form of historical record. A merely human life is a matter merely of human history, to which accordingly appeal must be made. The history is either sacred or profane. The testimony of the former is not here in debate and besides has been examined closely elsewhere by the present writer. Of profane history the witness is "brief, but endless" if indeed there be any such witness at all. The first and by all odds the most important is found in the *Antiquities* of the Jewish historian Josephus, precisely the work in which one would search for it with the liveliest interest and the greatest confidence. The attestation as

[3] *Hat Jesus gelebt?* and in *Berliner Religionsgespräch*, p. 39.

we read it now is clear, decisive, and unequivocal. Accepted at its face value it settles forever the question that now so agitates the head and heart of Germany. It deserves then the most conscientious and open-minded scrutiny.

Such a scrutiny discloses in the first place that the chapter in which the deposition is found is *concerned exclusively with calamities that overtook the Jews.* It is sandwiched between two other sections that tell of bloody disasters that befell God's people at Rome and Jerusalem. Now unless this passage itself tells of some sanguinary misfortune to his countrymen—and in spite of Chwolson it is hopelessly absurd and ridiculous to attempt any such construction—it seems impossible that Josephus should have introduced it in this connection. We make this preliminary observation in hope that the reader will bear it constantly in mind from the very start, and because it is of itself absolutely decisive against the whole section and against every emendation thereof that apologetic ingenuity can suggest. There is not one word of the entire passage that can stand against this single consideration, namely, that all the rest of the chapter, both before and after, is devoted to the afflictions that scourged the countrymen of the historian.

Here then is this famous section reproduced in its (condensed) context:

Archeology, Book XVIII, chap. III.

§ 1. Pilate, procurator of Judea, removes the army from Cæsarea to Jerusalem for winter quarters and against all precedent brings Cæsar's effigies by night into the Holy City. The Jews flock to Cæsarea protesting for five days, but in vain: the sixth day Pilate forms a plan to massacre them, but struck with their heroic devotion in laying down their bared necks he relents and orders back the images from Jerusalem to Cæsarea.

§ 2. Pilate undertakes to supply Jerusalem with water,

using sacred money. The Jews protest clamorously and abusively. So he distributes among the populace soldiers in citizens' dress; at a signal (when the Jews refused to disperse) the soldiers draw their concealed daggers and slaughter: "And they bore themselves no way mildly, so that the people, being caught unarmed by the soldiers attacking fully prepared, many of them perished thus and some ran away wounded. And so the sedition was stopped.

3. "And there appeared at this time Jesus, a wise man, if man indeed it be lawful to call him. For he was a doer of marvelous works, (a) teacher of men that receive the truth with pleasure. And many Jews and many too of the Hellenic (race) he brought over to himself. This was the Christ. And when on the evidence of the first men among us Pilate had condemned him to the cross, they did not cease who had loved him at first, for he appeared to them on the third day again alive, the divine prophets having spoken both these and myriad other wondrous things about him. And (even) until now the tribe of the Christians, named from him, is not extinct."

4. "And about the same time another terrible misfortune[4] confounded the Jews". . . . Then follows the story of the deflowering of Paulina in the temple of Isis by Mundus personating Anubis, and of the punishment of this sacrilege by Tiberius, who demolished the temple and crucified the offenders all but the principal, Mundus himself.

5. The misfortune of the Jews: 4000 are banished from Rome for the wickedness of four, a Rabbi and three confederates, who procured gifts from Fulvia, wife of Saturninus, under false pretences.

We can hardly covet the critical insight that sees in this § 3 the hand of Josephus. *The chapter deals solely with the misfortunes of the Jews at Caesarea, at Jerusalem,*

[4] ἕτερόν τι δεινόν.

*at Rome. The Section 3 is entirely out of relation to its context.*

Moreover, that § 4 follows immediately upon § 2 is plain to see in the words "*another calamity.*" The obvious reference is to the preceding massacre in Jerusalem. *There is no possible reference to this* § 3.

Furthermore, the style is not that of the historian. It is plain, straightforward, uninvolved, in contrast with the tangled meshes of the Josephine sentence.

Still more, however, and decisively, *the writer of* § 3 *is a Christian.* He declares positively, "This was the Christ."[5] Posing as Josephus, he says of Jesus "wise man," but instantly corrects himself, "if man indeed it is lawful to call him"; he describes Jesus as a doer of prodigies, as a teacher of the truth; he affirms distinctly the resurrection, "he appeared the third day again alive"; he accepts the whole body of ten thousand wonders told of him as Messiah and foretold of him by the divine prophets. Such faith as this, and such an open avowal, might satisfy even the Holy Office of the Inquisition.

Once again, the phraseology smacks strongly of the New Testament. Thus *γίνεται* in the sense of *comes* (Mark i. 4; John i. 6; 2 Peter ii. 1; 1 John ii. 18) and the change from past to present tense;[6] "that receive the truth with pleasure";[7] compare "the principal men" with "the head men"[8] of the Gospels, Acts, Epistles; also "they that loved him at first" with John xiii. 1, "having loved his own in the world, he loved them to the end"; also the "myriad wonders" with John xxi. 25, "The world could not contain the books that would be written."

Finally the phrase "until now" recalls the New Testa-

[5] *ὁ Χριστὸς οὗτος ἦν.*

[6] So also *παραδόξων*, as in Luke v. 26, *εἴδαμεν παράδοξα σήμερον.*

[7] Cf. Luke viii. 13, "receive the word with joy"; Acts xvii. 11, "received the word with all zeal"; James i. 21, "receive in meekness the engrafted word."

[8] *ἄρχοντες.*

ment "unto this day" (Matt. xxviii. 15) and indicates similarly a late date for the paragraph, surely later than A. D. 80, when Josephus wrote his Archeology. Schürer observes (§ 17, footnote 24) that "Josephus has certainly been interpolated by a Christian hand"; and in view of all the foregoing there should be no hesitancy in bracketing this section, with the great editor Bekker, as spurious.

To this internal evidence comes the decisive external fact that the section was unknown to Origen. This most learned of the Fathers, in his polemic against Celsus, had frequent and pressing occasion to use every scrap of outlying testimony to the Christian thesis assailed. As we shall immediately see he quotes copiously and repeatedly from Josephus witnessing concerning James the Just; he had every occasion and every motive to quote this incomparably far more relevant and far more important witness concerning the Christ. That he never calls it in evidence, is morally conclusive proof that he did not know of its existence, which can only mean that it was not in Origen's copy of Josephus. No attempt yet made to evade this conclusion seems worthy of any notice. The fact that the passage is not mentioned by still earlier writers, as Irenæus, Tertullian, Clement of Alexandria, and others, affords corroboration if any be needed.

It seems then that the non-Josephine origin of this section is indicated unambiguously by almost every kind of evidence that can be available in such matters. Its testimony would appear to be not for but distinctly against the position it was invented to support; for men do not fabricate documents to corroborate the true but to recommend the false. Let us not insist on this, however, but remain content with the obvious fact, that on the most favorable reckoning possible, the section labors under the gravest suspicion and can attest nothing save that itself is in the direst need of attestation.

Here at the outset it may be well to observe that the general hypothesis of Christian interpolation needs no vindication and involves no improbability. For that it is a fact in countless cases is admitted on all hands. Leaving aside the New Testament for the present, the list of outright pseudonymous Christian compositions, universally so recognized, is long and formidable. It is not necessary to burden these pages with any such list, since such lists are easily accessible and the general fact is nowhere in dispute. Moreover, of works probably genuine, it is the rare exception that has escaped interpolation. Jewish works were regularly adapted to Christian use by this approved process of intercalating Christian sentiments, dogmas, or allusions. Witness the Sibylline Oracles, the Testaments of the Patriarchs, and the Jewish Apocrypha in general. So far then from being antecedently improbable, such interpolation is very probable antecedently, it is more likely than not. Nevertheless, to leave a wider margin of safety, we shall employ this form of argument sparingly, not wherever its use is possible, but only where it is recommended by independent considerations.

A second reference of Josephus to Jesus might be imagined in the following paragraph (*Arch.* XX, 9. 1) treating of the death of James, "the brother of the Lord":

"Ananus, then, being such (as I have said), fancying he had now a fitting opportunity, since Festus was dead and Albinus was still on the road, assembles a Sanhedrin of judges, and having brought thither *the Brother of Jesus, him called Christ* (*James was his name*), *and* some certain *others* and having made accusations (against them as) lawbreakers, he delivered them to be stoned."

The words in italics[9] have been bracketed as spurious, —we think, correctly. Neander and others defend them,

[9] *τὸν ἀδελφὸν Ἰησοῦ τοῦ λεγομένου Χριστοῦ* (*Ἰάκωβος ὄνομα αὐτῷ*) and *καὶ ἑτέρους*.

and McGiffert says (*The Church History of Eus.*, p. 127, n. 39), "It is very difficult to suppose that a Christian in interpolating the passage, would have referred to James as the brother of the '*so-called* Christ.' "[10] Indeed! On the contrary, it is just because this phrase is the most approved Christian, evangelic, and canonic, that we suspect it in Josephus. It meets us in Matt. i. 16; xxvii. 17, 22; John iv. 25. The depreciatory "so" is not in the Greek. Thus we read of "Simon the one called Peter" (Matt. iv. 18; x. 2), "the high-priest the one called Caiaphas" (Matt. xxvi. 3), "the feast the one called Passover" (Luke xxii. 1), "the man, the one called Jesus" (John ix. 11), "Thomas the one called Didymus" (John xi. 16; xx. 24; xxi. 2), "gate the one called Beautiful" (Acts iii. 2), "tent the one called Holy of Holies" (Heb. ix. 3), where depreciation is out of the question. The indication is merely that of a surname or nickname or name in some way peculiar or extraordinary.

It seems incredible that Josephus should throw in such an observation at this stage without any preparation or explanation or occasion. Moreover, it is certain that Josephus has been interpolated elsewhere by Christian hands, and with precisely this same phrase, for Origen thrice quotes as from Josephus the statement that the Jewish sufferings at the hands of Titus were a divine retribution for the slaying of James: "Josephus says in his Archeology, 'According to wrath of God these things came upon them, for the things dared by them against James, the brother of Jesus the one called Christ'....And he says that 'the people too thought they suffered these things on account of James.' " (463) *in Mat.* XIII. 55. "The same [Josephus] seeking the cause of the fall of Jerusalem and of the demolition of the Temple....says, 'These [calamities] befell the Jews in vengeance for James the Just who was

[10] τοῦ λεγομένου Χριστοῦ.

brother of Jesus the one called Christ, since indeed they slew him though being most just.'" *Contra C.* I, 47. "Titus demolished Jerusalem, as Josephus writes, on account of James the Just, the brother of Jesus the one called Christ"—*Contra C.* II, 13 *fin.* The passage is still found in some Josephus manuscripts, but as it is wanting in others it is and must be regarded as a Christian interpolation older than Origen (against Hilgenfeld, *Einleitung*, p. 526, who thinks the passage has been expunged from Christian manuscripts of Josephus!). Now since this phrase is certainly interpolated in the one place, the only reasonable conclusion is that it is interpolated in the other. This notion that the death of James was avenged in the siege of Jerusalem is found in the bud in Hegesippus, who says: "And so he suffered martyrdom. And they buried him on the spot beside the temple.... This man became a true witness both to Jews and to Greeks that Jesus is the Christ. And straightway Vespasian besieges them" (Eus., *H. E.* II. 23, 18).

But does not the phrase itself attest the mere humanity of the Jesus? Now it is plain that if James or any one else was really the flesh-and-blood brother of the Lord or of Jesus, then this latter was assuredly pure-human. But is flesh-and-blood kinship meant by the term "brother"? It is not certain, it is not even probable. Winckler (in *Arabisch-Semitisch-Orientalisch*) and others have shown us how broad is the notion of brother in the East. In the New Testament itself the term is used continually, regularly, to denote religious relation without the remotest hint of blood kinship. In the West and to-day it is similarly used of all members of an organization secular as well as religious. In the Gospels[11] Jesus himself is made to ask, "who are my brothers?" And he answers, "They that do

[11] Matt. xii. 46-50; Mk. iii. 31-35; Luke viii. 21. See also Matt. xxv. 40; xxviii. 10; 1 Cor. ix. 5; Gal. i. 19.

the will of my Father in Heaven." Here then in the most ancient church we find distinct declaration that to be "Brother of Jesus" was to keep the law, to do the will of the Father in Heaven. Now it was precisely this punctilious fulfilment of the law for which this James the Just was famous. This fact is well known and universally admitted, so that it stands in no need of formal proof.

In Acts we hear a good deal of this James, but only in this character as the leader of the law-abiding disciples. No less an authority than Jerome (A. D. 387) has expressed the correct idea on this point. In commenting on Gal. i. 19 he says (in sum): "James was called the Lord's brother on account of his high character, his incomparable faith, and his extraordinary wisdom; the other apostles are also called brothers (John xx. 17) but he pre-eminently so, to whom the Lord at his departure had committed the sons of his mother" (i. e., the members of the church at Jerusalem). Similarly Origen. From 1 Cor. ix. 5 we see with distinctness that there was a class of Messianists, nearly coordinate with the Apostles, bearing the honored name of "Brothers of the Jesus," or "of the Lord"; also a class called "Brothers of Kephas." Hence in Corinth some said, "I am of Kephas"; others, "I am of Christ."

Indeed, it is never hinted that James was really consanguineous with Jesus. We hold then that this term "Brother of the Lord" does by no means imply any family kinship, that it most probably designates a class of earnest Messianists, zealots of obedience, and we venture to set them in close relation with the Corinthian "Those of the Christ."[12] Surely if a sect of early Messianists were known as particularly "They of the Christ," it is highly likely that they or some similar group should be known as "Brothers of the Lord" or of "Jesus." Especially does this seem in-

[12] οἱ τοῦ Χριστοῦ.

trinsically probable when we remember that there is no evidence that this name was employed before the notion of the earthly human life of Jesus was already established or at least establishing itself. That zealots should then call themselves and their earlier leader "Brothers of Jesus" is no stranger than that Loyola should found the "Society of Jesus." Besides we must never forget that names of the Christians did greatly abound, such as Saints, Disciples, Called, Elect, "of Paul," "of Peter," "of Christ," Nazaræans, Gnostics, the Perfect, Pneumatics, and others. From all of which we conclude that the phrase in question, no matter when first used, nor by whom, nor of whom, by no means implies any kinship or furnishes any proof of the pure-human character of Jesus.

The next reference to Christ by a profane writer is found in Tacitus:[13]

"Sed non ope humana, non largitionibus principis aut deum placamentis decedebat infamia, quin iussum incendium crederetur. Ergo abolendo rumori Nero subdidit reos et quaesitissimis poenis adfecit, quos per flagitia invisos vulgus Christianos appellabat. Auctor nominis eius Christus Tiberio imperitante per procuratorem Pontium Pilatum supplicio adfectus erat; repressaque in praesens exitiabilis superstitio rursus erumpebat, non modo per Iudaeam, originem eius mali, sed per urbem etiam, quo cuncta undique atrocia aut pudenda confluunt celebranturque. Igitur primum correpti qui fatebantur, deinde indicio eorum multitudo ingens haud proinde in crimine incendii quam odio humani generis convicti sunt. Et pereuntibus addita ludibria, ut ferarum tergis contecti laniatu canum interirent, aut crucibus adfixi aut flammandi, atque, ubi defecisset dies, in usum nocturni luminis urerentur. Hortos suos ei spectaculo Nero obtulerat et circense ludicrum edebat, habitu aurigae permixtus plebi vel curriculo insistens. Unde quamquam adversus sontes et novissima exempla meritos miseratio oriebatur, tamquam non utilitate publica sed in saevitiam unius absumerentur.—*Annals,* XV, 44.

With respect to this famous passage we must observe first, that *if it be genuine*, it was written in the first quarter

[13] For the translation and the context see *infra.*

of the second century, near the close of the last work of the great historian, most probably after the death of Trajan (A. D. 117). At the most then it records only a report accepted at that time among Christians. Now it is not at all strange that the fiction (if it be a fiction) of the death under Pilate should be current at that date, nearly three generations after the feigned event. If such a report originated at all, it originated (gradually to be sure) at some time most probably in the first century; it may easily then have obtained currency and reached the ears of Tacitus before A. D. 110. Its reproduction, at his hands, then, merely attests its existence at that date, but in no degree attests its correctness.

Thus far on the supposition that the passage proceeds from Tacitus;—we need make no other supposition for the purposes of our argument. Let it be genuine, if you will; it proves nothing that is worth debate. Since he has never attached any argumentative importance to the passage, the mind of the writer may be fairly supposed to be in a measure unprejudiced, and as a mere matter of critical candor he must not disguise from the reader that he most gravely doubts its genuineness. It has indeed been speciously contended of late that Poggio Bracciolini was the author of the *Annals*,[14] but there are very cogent reasons against this contention. This whole section, however, reads very much like fabrication or at least emendation of a Christian hand. Among other suspicious circumstances may be noted the following:

A. Such a remarkable persecution as here described, and such a passage from such an author, must have deeply impressed the early Christian mind. There is nothing else nearly equal to either in pagan history and literature of that century. We should expect them to stand out con-

[14] *Tacitus and Bracciolini. The Annals Forged in the Fifteenth Century*, London, 1878.

spicuous in the memories and memorials of the following generations. We know how zealously the data of martyrdom were cherished and even invented at an early period. It is inconceivable, then, that an event so supremely memorable should have escaped all record and all reference. Yet what is the state of case? *Early tradition is absolutely silent about both the Neronian persecution and the Tacitean testimony.* Paul would seem to have been in Rome about that time (A. D. 64). Surely he would have been involved someway in the proceedings. Yet there is no allusion to any part he played in the tragedy. True, in 2 Tim. iv. 6, 7, we read, "For already I pour myself out as offering, and the time of my dissolution is come; I have fought the good fight, have finished the course, have kept the faith; henceforth is laid up for me the crown of righteousness which the Lord shall give me in that day, the Just Judge, and not only to me but to all who have loved his appearing." But in verses 16 and 17 the scene shifts suddenly: "At my first defense none was for me, but all forsook me—let it not be reckoned against them—but the Lord stood by me and strengthened me, that through me the preaching might be fulfilled and all the nations hear: and I was delivered from (the) lion's mouth. The Lord will deliver me from every evil work and will save me unto his kingdom the heavenly."

Again in verse 11 all have deserted him but one: "Luke only is with me." But in verses 19-21 he is surrounded by a numerous company, "Eubulus and Pudens, and Linus and Claudia, and the brethren all." Out of such contradictions nothing can be made, save only that there is no hint at anything like the Neronian persecution. The writer or writers seem not to have known any tradition concerning it, which they could work into these pastorals.

The first Epistle of Peter, addressed to the elect of the dispersion in Northern Asia Minor, is much concerned with

the persecution and "fiery trial" that has overtaken them, but though apparently written from Rome ("Babylon," v. 13) it contains not the remotest reference to the "fiery trial" through which it is supposed the church there had passed. Some reference, however, under such circumstances, would seem to be so natural as to be almost inevitable.

Not even in the Apocalypse do we find any clear or even probable allusion to an event that would have bulked so hugely in the early Christian consciousness. On this point we need not enlarge; enough to refer to the works of Mommsen and Neumann; even Furneaux admits that "The supposed references....are certainly in great part to be otherwise explained," though he still thinks there "are points in which such allusions can hardly be excluded," an opinion that seems to be the last remnant of departing prejudice. Why then did the Apocalyptist not refer to this tremendous persecution distinctly or at least unequivocally, if he had ever heard thereof?

Turning now to Clement of Rome, we find him (C. 5) very naturally setting before the eyes of his correspondents "the noble examples that belong to our generation." The fierce persecution detailed by Tacitus must have been perfectly known to him, yet he seems never to have heard of it. The sufferings of Peter he attributes to "unrighteous jealousy." "Not one nor two but more trials he underwent and so having borne witness he fared to the appointed place of glory. By reason of jealousy and strife Paul exemplified the prize of patience. Seven times cast into bonds, exiled, stoned, made preacher both in east and west, he received the noble renown of his faith, having taught the whole world righteousness and come to the bounds of the west, and having borne witness before the rulers, so he departed from the world and fared unto the holy place, having become a chiefest pattern of patience." We do not

pretend to know the exact meaning of such words; it seems doubtful whether Clement himself knew. But it seems certain that they convey no hint of the Neronic persecution as described in the Annals; nay more, they seem to imply unmistakably that their author had never heard of any such "fiery trial."

Passing to the "Ignatians," we find the letter to the Romans written in a style and mood of extreme exaltation. "Ignatius" yearns passionately for the arena, he longs to be ground as wheat by the teeth of wild beasts. Surely if he had ever heard of the terrible experience of the Romans themselves such a rhetorician would have let some hint escape him. But he does not, and his silence appears to admit of but the one and the same explanation.

It is superfluous to pass in review the other Christian writers of this era. They are consistently dumb on the subject under discussion, and their collective stillness makes the argument from silence as convincing as in the nature of the case it ever can be.

Far down the stream of history, over one hundred years from the date of the conflagration, we find at last, in a fragment quoted by Eusebius (*H. E.* IV, 26) from a *Libellus* addressed to Antoninus (Aurelius) by Melito, Bishop of Sardis (near A. D. 170), the first Christian allusion to Nero as an enemy of Christians. It declares: "For *what has never before happened,* the race of the pious is now suffering persecution, being driven about in Asia by new decrees. . . . for our philosophy formerly flourished among the barbarians, but having sprung up among the nations under thy rule, during the great reign of thy ancestor Augustus, it became to thine empire especially a blessing of auspicious omen. And the most convincing proof that our doctrine flourished for the good of an empire happily begun, is this—that there has no evil happened since Augustus's reign, . . . . only Nero and Domitian, per-

suaded by certain calumnious men, wished to slander our doctrine, from whom also it has come to pass that the falsehood has been handed down by unreasonable custom of information ('sycophancy') against such (Christians)." One moment we may pause to note that the good bishop goes back to the reign of Augustus for the origin of "our philosophy," which had already existed among the "barbarians" (i. e., the Jews,—Tatian calls the Jewish Scriptures "barbaric,")[15] and which must then have been essentially monotheism,—and then we observe that he has apparently *no knowledge and no idea* of the Neronian persecution as now set forth in Tacitus, and that he is arguing that good emperors have tolerated while only the wicked have discountenanced Christianity. Hence he adds: "But thy pious fathers corrected their ignorance, having frequently rebuked in writing many who dared to attempt new measures against them"—in evidence whereof he refers to Adrian's Epistle to Fundanus and to many others.

No new furrow need be driven through the field so well plowed by Keim, Overbeck, Mommsen, Schiller, Lightfoot, Ramsay, and others. It is enough that Melito, who seems to have been so exceedingly well versed in the relation of Christianity to the state, still gives no hint of anything resembling the Tacitean persecution . And yet to do so would have suited the purposes of his argument admirably. With great force he could have said: "Nero the matricide, the worst of men, Nero did indeed persecute us atrociously, to hide his own iniquity, as your own historian Tacitus bears witness, and behold what swift and just and terrible vengeance overtook him!" How could Melito have failed to make such a telling and obvious point?

Another descent brings us to Tertullian, who admittedly knew and made use of Melito's booklet in his own *Apologeticum*. His argument is the same, that good govern-

[15] In describing his own conversion (Address to the Greeks, c. 29).

ment favored and bad government disfavored the Christians, but he is far more reckless in assertion. He declares (C. 5) that "Tiberius, when intelligence reached him from Syria Palestine of what had there revealed truth of Divinity itself, reported to the Senate with the weight (*praerogativa*) of his own vote. The Senate, because it had not itself tested, rejected (his proposal); Cæsar maintained his judgment, threatening peril to accusers of Christians." Let the reader not be surprised at such history made to order. "Consult your records (*commentarios*), there you will find Nero the first that raged with Cæsarean sword against this sect when rising most at Rome. But in such a founder of our condemnation we glory even, for whoso knows him can understand that only something signally good was condemned by Nero. Domitian too made trial, a portion of Nero in cruelty, but being also man readily he checked his own beginning, restoring even whom he had banished. Such always our persecutors, unjust, impious, base, whom you yourselves are wont to condemn, those condemned by whom you are wont to restore."

Here one begins to suspect that Nero is made to play the rôle of persecutor only because he was so perfectly suited to the part. But even Tertullian reveals no notion of such a Neronian persecution as we read of in Tacitus. Yet he was acquainted with this historian, whose *Historiae* he cites at length (C. 16), on whose name he puns, whom he cordially hates for defaming the Jews. Had he read of Nero's burning the Christians alive, would he have used such vague and commonplace imagery as "raged with Cæsarean sword" and "through Nero's cruelty they sowed Christian blood"? Remember that Tertullian was a rhetorician to his finger-tips—would he have neglected such an exceptional opportunity for the display of his thrice-favorite art?

It seems needless to discuss still later testimony, as that

of Lactantius (*De mort. persec.* 2), of Origen (*Eus. H. E.* III, 1) of Eusebius (*H. E.* II, 25), and of Jerome; these late writers have at last learned after two centuries or more of ignorance that Peter and Paul fell victims to Neronian fury, but they still have no idea that Nero falsely accused the Christians of setting the city on fire, nor do they hint that a "vast multitude" lit up the Roman night with the flames of their burning bodies. Not until the fourth century, in Ep. 12 of the forged correspondence of Paul and Seneca, do we read that "Christians and Jews, as if contrivers of (a) conflagration, when put to death are wont to be burned." But even here the allusion, if there be any, to the Neronian persecution is extremely vague.

It must be added that the Jews are here associated with the Christians, that they could hardly have been sharply separated in Rome A. D. 64, that they far more than Christians were open to the charge of hatred of the human race ("Against all others, hostile hate"—Tacitus, *H.* 5, 2), that they had already felt twice in Rome (under Tiberius and under Claudius) the weight of the imperial hand, that Lucan, Pliny, Persius, Seneca—all writers of that era, speak of the Jews with sharpness, never of the Christians, and it will appear practically impossible that they could have escaped in any such persecution as the Tacitean. But if they did not escape, if they suffered, this must have been known to their great historian and champion, Josephus, who was a young man at the time.

Now this writer in his Archeology (XX, 8, 3) protests against the gross inaccuracies and falsehoods of the biographers of Nero, both favorable and unfavorable, while disclaiming any intention to correct or supplement them in general; "But what things befell us Jews we shall exhibit with great accuracy[16] shrinking to show plainly neither our calamities nor our sins." If then even a few

[16] οὐ παρέργως.

Jews had fallen victims in the capital to Neronian calumny and savagery, there seems to be no doubt that Josephus would have known and noted it. Yet he gives not the slightest hint that any such rumor had ever reached his ears.

Here then we stand in presence of the unbroken and universal silence of over two hundred years concerning an alleged event of capital importance, transacted in the very center of knowledge and information and rumor, yet never once mentioned by any one among many whose especial interest it was to tell of it often and to dwell on it at length. Nor can any one suggest the slightest reason for this silence, for this studied suppression of a highly momentous and dramatic incident in a reign that was a favorite subject of historic delineation and that lent itself especially to high coloring and picturesque exaggeration. Such considerations seem ample to weight the scale heavily against the genuineness of the passage in question.

B. On looking more narrowly at the whole Tacitean context, we find that it suggests quite independently many doubts kindred and hardly less grave. The account of the great fire extends through six chapters beginning with the 38th: "Follows a disaster, whether by chance or by guile of the prince, is uncertain." A vivid description is given. Chapter 39 tells how Nero did not return from Antium till the flames approached (as they ultimately devoured) his house. He took instant and popular measures to relieve the homeless and destitute, but "without avail, since rumor had gone abroad that at the very moment of the city in flames he had gone upon a private stage and sung the Fall of Troy, likening present ills to ancient calamities." Chapter 40 tells of the end put to the conflagration at foot of the Esquiline, and of its second outburst involving fewer deaths but more widespread destruction. Chapter 41 enumerates some of the elements of the fearful loss. Chapter

42 tells how "Nero made use of his country's ruins and erected a house" in which the genius and audacity of Severus and Celer would defiantly outvie the prodigality of Nature herself. It seems plain that the immense achievements and immenser conceptions of these architects and landscape gardeners must have required years for their elaboration and even partial execution. Chapter 43 tells of the rebuilding of Rome itself not in the old irregular fashion, but "with rows of streets measured out, with wide-wayed spaces, with limited height of buildings, and areas laid open and colonnades added to protect the frontage of the tenements (*insularum*)." This description is elaborated and what part Nero took in the rebuilding is emphasized. These changes pleased in general both by their utility and by their beauty, though some there were that said the old was better.

A city can not be rebuilt in such substantial fashion ("with stone from Gabii or Alba, impervious to fire") in a day or month or year, nor without enormous outlay of money, and the imperial treasury seems to have borne the weight of the expense. It is not strange then but nearly inevitable that the next chapter should continue thus: "Meanwhile by contributing funds Italy was laid waste throughout, provinces subverted and allied peoples and whatever states are called free. Even the gods fell a prey to this plunder," their temples being robbed of gold and votive offerings and even the images of the gods themselves.

It appears then that chapter 45 is the natural and almost inevitable continuation of chapter 43, stating the necessary consequences of the methods and aims of Nero as therein set forth. Between these two chapters thus so closely united in thought we now read chapter 44, *which has no intimate connection with either.*

"And these things (the gradual Neronian rebuilding)

were provided by human counsels. Next (*mox*) were sought propitiations to the gods and recourse was had to the Sibyl's books, whence followed supplication to Volcan and Ceres and Proserpine, and Juno was propitiated by matrons, first in the Capitol, then at the nearest point of the sea, with water drawn whence the temple and image of the goddess were sprinkled; and sacred banquets and night-long vigils did the women celebrate who had husbands. But not through human effort, not through largesses of the prince nor appeasements of the gods did the ill report subside, but still the fire was believed (to have been) ordered. Therefore to get rid of the rumor Nero substituted as guilty and subjected to most exquisite tortures (those) whom hated for their abominations the populace used to call Christians. The author of this name, Christus, had been executed in the reign of Tiberius by procurator Pontius Pilate; and though repressed for the moment (this) pernicious superstition was breaking forth again, not only through Judea, source of this evil, but even through the capital where all things hideous or shameful pour together from everywhere and catch the crowd. Accordingly first were hurried away (to trial those) who confessed (the charge), then by information of these an immense multitude not so much for the crime of incendiarism as hatred of the human race were convicted (or conjoined, *convicti* or *conjuncti*). And to them perishing were added mockeries, (as) that clothed with hides of wild beasts they should die by mangling of dogs, or affixed to crosses or doomed to flames, and, when day had departed, should be burned for purpose of nocturnal illumination. Nero had offered his gardens for that spectacle and was exhibiting a circus show, mixing with the crowd in the garb of a charioteer or standing on a car. Whence although towards persons guilty and deserving the most exemplary punishment there arose pity, as if not for public

good but unto the savagery of one man they were being sacrificed."

Let the reader of this chapter thus literally translated judge whether it fits in with either chapter 43 or 45, which fall so naturally together. Let him note that the whole story is intrinsically improbable; that it implies a very old and long established and numerous church in Rome, and a hatred on the part of the people that seems at that time quite incredible; that no proper meaning can be attached to "were confessing"—confessing what? Arnold naturally replies, the charge of "firing the city." But that seems wholly incredible. Surely they had not fired it and would not lie against themselves. Ramsay thinks they confessed they were Christians, Von Soden even so translates it! Doubtless. But Christianity was not then a capital offense; it was only the crime of burning Rome that could bring down on them such condign punishment. Moreover these "first seized" not only confess but implicate an "immense multitude." In what? In firing the city? Impossible! They were not guilty. In being Christians? Equally impossible. There was not an immense multitude of Christians in Rome, and even if we understand only a few score by this *multitudo ingens* it seems impossible that the few first seized would betray the whole Christian community to such a monster as Nero. That would have been neither wise as serpent nor harmless as dove. Here then the story is unbelievable. Note again that the spectacle must have endured for a long time, else surely the Roman mob, used to such sights, would not have felt pity for a class of hated criminals who had burned two-thirds of Rome and caused unspeakable ruin and woe. And why do Suetonius (*Ner.* 38) and Dio Cassius (62, 16, 1) and Pliny (*N. H.* 17: 1, 1, 5), who all have no doubt that Nero himself ordered the conflagration, and who must have known of such a long continued slaughter of innocents, why do they

never even remotely allude to such a tremendous matter? Lastly, when did this persecution take place? Naturally one would suppose that the report started at once, while men's minds were wild with excitement, as did the rumor of Nero's fiddling mid the flames of Rome. But no one can gain such an idea from chapter 44, which mentions the report after the account of Nero's architectural reconstruction and indicates that he took severe measures not, as would be natural, in the heated state of public feeling, but only long after and because the report refused to abate. This is not indeed incredible, but it is certainly perplexing.

And what can be the force or reference of "meanwhile" (*interea*), with which the next chapter opens? If we omit chapter 44, the reference is obvious, the term is so appropriate as to be almost unavoidable: Nero was rebuilding Rome on a scale of unexampled grandeur at incalculable outlay of imperial treasures. "What an abyss of expense! Whence came the necessary funds?" involuntarily exclaims the reader. The author answers: *Meanwhile* Italy, the provinces, the allies, the free states, the very sanctuaries of the gods were devastated to meet the prodigious cost. Now insert chapter 44. At once the connection is broken, the thought is left hung in the air, extraneous and remotely related matters distract the attention, and when the subject is resumed in chapter 45, there is found nothing in chapter 44 to which the "meanwhile" can refer—for it is unreasoning to say "Nero was burning Christians and the people were moved to compassion, meanwhile the empire was plundered." We must go back to chapter 43 to find the natural attachment for chapter 45—a clear indication that the intervening chapter has been interpolated.

C. Does some one (as Von Soden) object that the style is too Tacitean not to be genuine? We reply that quite as good imitations are frequent enough. In his *Letters to*

*Dead Authors* Mr. Andrew Lang has reproduced admirably a dozen widely diverse styles, none of them at all like his own. Such a *tour de force* is exceptional, but it shows that the limits of possibility in such matters are very wide. Besides, are we sure that the style is really so much like that of Tacitus? Careful scrutiny has perhaps not yet been made, but there are certainly counter-indications. We pass over the well-known facts that the text is here particularly wavering; that it is strange that Tacitus should speak of Pontius Pilate merely as procurator, without specifying of what, whereas such a form of speech was most natural for the interpolator; that the extremely harsh judgment of the Christians is puzzling in the intimate friend of Pliny from whom he would almost surely have learned better; that the "vast multitude" is an exaggeration more than Tacitean and not at all paralleled by the *iacuit immensa strages* of *An.* VI, 19,[17] and we would fix attention solely on one purely stylistic consideration, the expression *humani generis.* The whole sentence has sorely vexed the wits of commentators, but especially these words. Muretus (following Faernus?) boldly strikes out the word *humani* and understands by *generis* the Christian race! Acidalius sees that this cannot be and accordingly alters *humani* into *Romani*: They were condemned for hatred of the Roman race! Indeed it seems almost impossible that Tacitus should have written *humani generis. Everywhere* else he writes *generis humani.*[18] It is in the last degree improbable that such a consummate stylist as Tacitus would here just this once deviate from his lifelong habit, especially as the inverse order produces with the

[17] The slaughter is called immense because it struck "all" (*cunctos*) the implicated friends of Sejanus, without regard for age or sex or other conditions; but a multitude is huge only by its mere number.

[18] As *Ann.* III. 59, XII. 14, *Hist.* I, 30, III. 68, V. 25, *Ag.* 2. Editors in general make no note of this fact. After this study was complete, the writer observed the remark of Nipperdey: "*humani generis,* Sonst sagt Tac. stets in der gewöhnlichen Ordnung *genus humanum.*"

foregoing word a disagreeable hiatus: *odio humani.* No very delicate ear is needed to perceive that *odio generis* is a much pleasanter collocation. Besides the whole weight of Tacitean related usage falls against the inversion. It is the fixed custom of the historian to modify *genus* by following and not preceding words. Thus *genus hominum* (three times, almost the same as *genus humanum*), *genus animalium, belli, militum, mortalium, mortis, questus pensi, orandi, maiorum, telorum, spectaculorum, belli, studiorum, pugnae, Arsacis, vitae,* and *generis regii.* Apparent exceptions to this rule are readily seen to be due to rhetorical considerations, especially to the desire to maintain the favorite order: adjective, genitive, (modified) noun, as in *omne mortalium genus* (*An.* XVI. 13), *novum officii genus* (*Hist.* I. 20), and to make emphatic, as in *oppidanum genus* (*An.* VI. 15), *pernix genus* (*Hist.* II. 13). We may affirm then with much confidence that the inversion in question of itself stamps the passage as not from the hand of Tacitus.

* * *

By three entirely independent lines of inquiry we are led to precisely the same result. Look at it as you will, the chapter wears the appearance of being interpolated. Indeed, it must be, not unless one of these signs fail, but unless they all fail, unless all are simultaneously and in the same sense misleading. Even if the doubt raised by each one of these separate inquiries were not very strong, even if it still left the chances two to one in favor of the genuineness, yet the chance that all three would thus simultaneously deceive would be only eight in twenty-seven, the chances would be nineteen to eight in favor of interpolation. We have no choice then. Coerced by this consilience of results, we *must* regard the passage as probably interpolated, unless there be some strong antecedent reason in favor of genuineness and against interpolation.

Is there any such reason? Certainly not. The whole history of post-Apostolic and patristic literature shows that interpolation was a most familiar favorite. In fact, it would rather seem strange if such an opportunity had been neglected. We conclude then decisively that this famous chapter, as it now stands, is with compelling probability to be ascribed to another hand than that of Cornelius Tacitus. But even if entirely genuine and uncorrupted it would still be worthless in evidence, for it merely states a rumor about an alleged occurrence of nearly a hundred years agone. Accordingly, the passage is in all likelihood inadmissible in court; but even if admitted, it could prove nothing to the point.

The allusions of Suetonius to the Christians are the following: "Judaeos impulsore Chresto assidue tumultuantes Roma expulit,"—*Claudius,* XXV. "Afflicti suppliciis Christiani, genus hominum susperstitionis novae et maleficae,"—*Nero,* XVI. Both of these appear too slight for the basis of any judgment.

It will be noticed that there is no reference to the Founder of Christianity. The force of the *impulsore Chresto* is uncertain. It may refer to some Roman Jew named Chrestus, who stirred up his compatriots to riot, or it may refer to Messianic agitation among the Jewish populace, to their disputes among themselves about the Messiah, the Chrestus. Be this as it may, there is here no implication of the life and death in Galilee and Judea. Dio Cassius, however, says (IX, 6) he "did not expel" them but forbade their assembling and dissolved their clubs authorized by Gaius. On the other hand, Acts xviii. 2 refers the presence in Corinth of Aquila and Priscilla to this decree of Claudius expelling "all the Jews from Rome" —a statement almost certainly exaggerated.

The second mention occurs in a list of severe regulations made in Nero's time. If genuine, it would show

merely that "Christians" were known as early as Nero, which would add nothing to our knowledge, and that they were on some occasions condignly punished. Possibly the notice in Tacitus is merely an expansion of the brief deliverance by Suetonius. A much more probable cause of the "punishments" would be some such disturbances as occurred under Claudius *impulsore Chresto* or provoked Tiberius to expel the Jews from Rome (Suet. *Tib.* XXXVI). Among the latter were included *similia sectantes,* whom also Tiberius *Urbe submovit sub poena perpetuae servitutis, nisi obtemperassent.* The *sectantes* are thought to be converts to Judaism, possibly they were incipient Christians. The words *nisi obtemperassent* seem to indicate great turbulence or unrest among the Jews under Tiberius near the supposed date of the crucifixion. This seems intrinsically highly probable, at least to us who regard the whole Christian movement as the outcome of generations, even centuries, of agitation among Jews and their proselytes. Sharp separation between Jews and Christians does not seem possible till the second century, especially the era of Bar Cochab.

The letter of Pliny to Trajan may also be quoted in this connection. It says nothing of the origin or Founder of Christianity; at most it tells only of the practices of the Christians in Bithynia about A. D. 110. There is no implication, not even the slightest, touching the pure-human reality of the Christ or Jesus. Whether this correspondence of Trajan and Pliny be genuine or not, is accordingly quite indifferent for the purpose of this discussion.

Any investigation of the matter would be superfluous at this stage of the argument. Lucian (120-200 A. D.) in his *De Morte Peregrini,* 11, 41, in *Alexander,* 25, 31, and in the perhaps spurious *Philopatris,* 12, makes mention of "Christians" and the "man impaled in Palestine," but only under the Antonines; Dio Cassius also, but A. D. 220.

Herewith the references to Christianity in pagan literature before A. D. 150 are exhausted. After that date the Gospel story had certainly taken definite form; it is widespread among Christians, who are themselves numerous throughout the empire; it has certainly reached the ears of the heathen, and any number of allusions in profane writers would merely attest the currency of the Gospel story, but would supply no testimony whatever to its authenticity. It seems useless then to quote this literature any further. We close this scrutiny, therefore, with this result, already announced: *Profane history supplies no testimony whatever to the pure-human character of Jesus.*

In order to estimate properly the value of this *argumentum e silentio,* we must remember that apparently the profane writers could have had no motive in suppressing information if they possessed it. Christianity was for them merely a pernicious and despicable superstition,[19] they would have been rather pleased to trace it back to a criminal crucified in Jerusalem. On the other hand, it is unlikely that any reference by the pagans would have been allowed by the Christians to perish. These latter were very jealous of all such material of argumentation and cherished it, as is shown vividly by the admitted fact that they even invented it diligently.

Possibly the heathen may have felt little interest in the crucifixion, its antecedents and its consequents; but the same cannot be said of Josephus. As a Palestinian Jew, a professional historian and a chronicler, it seems altogether impossible that he should not have known or have heard of the Life and Death of Jesus. He tells us minutely enough if somewhat obscurely of John the Baptist (*Arch.* 18, 5, 2), but John was in no way comparable with Jesus. In fact, he

[19] The terms used by Tac. Plin. Suet. are strikingly alike and suggest, but do not prove, some kind of interdependence or common dependence: *Exitiabilis superstitio, superstitionem pravam et immodicam, superstitionis novae et malificae.*

fills his pages with events altogether trivial by the side of the words and deeds of the Nazarene. It is not only to us at this 1900 years' remove, in the perspective of history, that the events appear in such relative significance. There was nothing in the career of John to match the execution on Calvary: nothing to pair with the works of Jesus, minimize them as you may. If Jesus was pure-human, then he was an astounding personality, in name and fame the Baptist must have been comparatively insignificant. Consider, too, how closely the twain were related, the Forerunner and the Messiah. For the gossipy annalist to know of John, but not of Jesus, would be as if the contemporary historian of the Reformation should know of Zwingli but not of Luther.

We dismiss then the hypothesis that Josephus was ignorant of the Christ, if the latter was pure-human, as altogether impossible. But knowing of him, could he have passed him by in silence intentionally? It seems hardly possible. If Josephus was a Christian (in secret), surely he would let pass no such opportunity to do his faith inestimable service. If he was sincerely an orthodox Jew (as almost certainly he was, so the Christian writers themselves attest), he must have believed that his countrymen did right in rejecting the pretender, he must have rejoiced in their action,—why then suppress it? Or even if he was uncertain in mind, then he must have pondered the matter, must have deemed it of high importance, and as it occupied his thoughts, why did he forbear all expression? No! we can not understand the silence of the historian, except on the supposition that Jesus was unknown to him historically. It was precisely this circumstance that puzzled the Christians themselves of the early centuries and induced one of them to cut the Gordian knot by interpolating the section 3. In fact, the marvel would be if some one had not made just such an interpolation. As already observed,

such insertion of apt material at proper places was a favorite form of that early logic.

Bishop Lightfoot admits with apparent irritation that Josephus has preserved a "stolid silence about Christianity," but thinks this "can not be owing to ignorance, for a sect which had been singled out for years before he wrote, as a mark for imperial vengeance at Rome, must have been only too well known in Judea." Of course, the allusion is to the Neronic persecution, and the reasoning sounds plausible. But we have just seen that this persecution is a matter for the very gravest doubt. Moreover, we see no reason why the Messianic agitators in Rome should take their cue from Palestine, or why the name Christian might not have been known in Rome even earlier than in Palestine. In fact, the name was not Palestinian, if we may believe Acts xi. 26,[20] it was applied to the Disciples at Antioch and was for an uncertain period only on the lips of enemies (not, however, *Christians* but *Chrestians*).[21] We see, indeed, no reason why such a movement might not have started independently in various places and nearly simultaneously. That there was originally any unity or central dependence in the propaganda is decisively negatived by Acts in more than one place, as already set forth in *Der vorchristliche Jesus*. It seems unquestionable that the greatest variety of faith prevailed in the early communities; from Rome to Jerusalem no inference is allowable.

Much more, however, not only does the fact that the Gentile called groups of the new faith by the contemptuous name of "Chrestians," by no means imply that these recognized the name and thought of themselves as distinct from Jews and proselytes, but the opposite seems attested by Acts xxi. 26, where it is said to Paul, "Thou seest, brother,

[20] Cf. xxvi. 28; 1 Peter iv, 16.

[21] From Χρηστός = Χριστός, Blass, *Gram. N. T. Grk.*, pp. 8, 63.

how many myriads there are among the Jews of them that have believed, and all are zealots for the law." These then had by no means separated themselves from the faith of their fathers, they were still one with the people.

If then Josephus knew of Christianity in Palestine, as is likely, he knew of it as one among many shades of religious enthusiasm or conviction, which had not detached itself from the general mass, which had not yet taken definite shape and outline. As thus inchoate and nebulous or confounded with the Essenes, it may have appeared to him of little significance and easily have been passed over when he treated of the principal sects of Jewish philosophy (*B. J.* II, 8, *Arch.* XVIII, 1). *It is only when we assume the current hypothesis concerning the origin of Christianity,* that the silence of Josephus appears strange and "stolid." But if it came not by observation, so that one could say "Lo here!" if its coming was like the gentle play of summer lightning, illuming the whole circuit of the Mediterranean, shining all round nearly simultaneously, it may very well have long escaped recognition as a distinct phenomenon. Especially if, as seems now to be proved decisively,[22] it was in large measure a *mystery*-religion propagated in great secrecy, if it was first heard in the ear and only much later proclaimed on the house-top,[23] if the "beautiful deposit"[24] of doctrine was committed to the novitiate under solemn and awful circumstances and only after "the beautiful confession" had been made under imposition of hands "before many witnesses,"[25] then such a secret cult carefully "guarded" might long escape the notice or at least the interested attention of a Josephus. Such reflections seem to break completely the force of the great bishop's argu-

[22] In the writer's forthcoming book, *Ecce Deus.*

[23] Matt. x. 27; Luke xii. 3.

[24] παραθήκη, 1 Tim. vi. 20; 2 Tim. i. 12, 14.

[25] 1 Tim. vi. 12-13.

ment, of which the sinew lies in the tacit assumption of all that theory of the beginnings of Christianity which we set out to disprove.

How then shall we sum up the situation? Thus:

*a.* It is morally certain that the Josephine passage (*Arch.* XVIII, 3, 3) is a Christian interpolation.

*b.* The Josephine passage concerning James (*Arch.* XX. 9, 1) has certainly been tampered with by Christian hands and as it now reads is almost surely an interpolation.

*c.* The chapter in Tacitus lies under the very gravest suspicions.

*d.* The sentences in Suetonius *may be* genuine, but they attest nothing strictly relevant. Like may be said of the Pliny-Trajan correspondence.

*e.* Even if the utmost should be conceded to these pagan authorities, they would still bear witness to two things only: (1) That so early as Nero there were so-called Christians or Chrestians in Rome, and that they fell under the extreme displeasure of that emperor. (2) That so early as perhaps A. D. 117 the origin of the Christian Cult was referred to a Christ that was said to have been crucified in Judea by Pontius Pilate (say A. D. 30), 80 or 90 years, nearly three generations, before.

Further than this these profane depositions do not go. It is seen at once that they do not touch the real point at issue, and we may now re-state as fully proved our first thesis: *Extant profane literature is silent concerning the life, career, and death of a pure-human Founder of Christianity.*

But may there not be non-extant profane testimony, over which the oblivion of centuries has settled? Impossible! For remember that the Christians were keen-witted and numerous, that they were nurtured in age-long controversy, that they had every reason, incentive, and opportunity to preserve any and every profane witness to the

traditional origin of their system, which would have been invaluable in their debate with unbelievers. Men like Justin who peered into every cranny and crevice of Scripture for confirmation of their story, like Clement and the apologists who ransacked every corner of pagan literature for materials of argument, like Melito and Tertullian and the whole industrious hive of interpolators and pseudonymists who invented history and scriptures wholesale as needed, —not six generations of these one and all would have neglected or overlooked any and every profane testimony in their own behalf, when even a single one would have been the end of controversy.

No! The fact that no Christian writer cites any such testimony is decisive proof that there was no such testimony to cite, and we may now finally affirm that the negative external witness, of contemporaneous history and literature, is as clear, as strong, as complete, as conclusive, as in the nature of the case it is possible for such witness to be. The negative internal witness, of the New Testament itself, has already been found to be eloquent and unequivocal. Positive counter-proofs in great number and variety all converge like meridians upon the same thesis. In a word, the pure-human Jesus of the critics is denied and the Divine Jesus of Proto-Christianity is affirmed by every form of consideration that has yet been adduced. What else is needed to shape the judgment of unbiased reason?

## ADDENDUM.

The reader may not unnaturally ask, "But what has the illustrious Guglielmo Ferrero to say on this subject?" His notable work on the *Greatness and Decline of Rome* comes down to A. D. 14, just half a century short of the Conflagration, but elsewhere, as in his Lecture on Nero (*Characters and Events of Roman History*, pp. 103-141), he glances at the flames, though scarcely with a severely

critical eye. "The history of Cæsar's family, as it has been told by Tacitus and Suetonius," he expressly rates as a mere "sensational novel, a legend containing not much more truth than the legend of Atrides" (p. 138); and yet, strange to say, precisely where this novel is least credible, where it ceases to be intelligible even, and where the apparent attestation is reduced one-half, being that of Tacitus alone unsupported by Suetonius, precisely there he accepts it eagerly, not merely at par but rather at a premium, and without the smallest grain of critical salt to save it. Witness the following quotations:

"An inquiry into the causes of the conflagration was ordered. The inquest came to a strange conclusion. The fire had been started by a small religious sect whose name most people then learned for the first time: the Christians.

"How did the Roman authorities come to such a conclusion? That is one of the greatest mysteries of universal history, and no one will ever be able to clear it. If the explanation of the disaster as accepted by the people was absurd, the official explanation was still more so" (p. 131).

And again: ". . . .but it certainly was not philosophical considerations of this kind that led the Roman authorities to rage against the Christians. The problem, I repeat, is insoluble. However this may be, the Christians were declared responsible for the fire; a great number were taken into custody, sentenced to death, executed in different ways, during the festivals that Nero offered to the people to appease them. Possibly Paul himself was one of the victims of this persecution" (p. 133).

"Behold how small a fire how great a wood enkindles!" How much more about this "inquiry" and "inquest" does Ferrero know than did Tacitus, and yet Tacitus is Ferrero's only authority, and that too an authority already emphatically discredited as "a sensational novel"! The plant of History would seem to be a hardy annual and at times

might be likened to a grain of mustard seed. It is interesting to surprise it now and then as it grows.

But the important point is that the brilliant Italian distinctly and repeatedly declares "the problem is insoluble." And well he may. For while no one will question the keenness of his analytic faculty or the vigor of his reconstructive imagination, yet even these and more can hardly avail to make clear the general detestation of the few "pious idealists" whom "the people used to call Christians" while the same name had never yet been heard "by the most of the people"; or to explain how "a great number" (strictly "an immense multitude"—as Church and Brodrib render it) could be sentenced and executed out of "a small and peaceful congregation."

Gibbon and more especially Schiller have argued that it was the Jews who were slaughtered in such numbers and amid such torments. Impossible, as we have seen; for in that case Josephus would have known and made mention of such a calamity to his countrymen. And why should Tacitus commit the blunder of substituting the nearly unknown Christians for the familiar Jews? Others have guessed that the Jews under the patronage of Poppæa incited Nero against the Christians—their own kinsmen! But not only is this conjecture a wholly gratuitous calumny on the Jews, but it presupposes a bitter hatred and an ancient grudge of Jews against their Christian brothers, such as was unreal and impossible at that time even in Jerusalem, much more among the liberal Jews of the Dispersion (Compare Acts xxi. 20, xxviii. 17-25). Moreover, if the Jews had slandered the Christians in such infamous and ruinous fashion, why does not at least one among so many Christian authors, all of whom would have eagerly exploited any such fact or any such rumor, make some mention or give some hint of such a prodigious iniquity? No! Ferrero is right, and his admission is sig-

nificant: it is quite impossible to understand the "mystery" of the Tacitean passage regarded as genuine, "no one will ever be able to clear it." What then is the obvious suggestion? Is it not that the incomprehensible chapter is spurious, or at least altered beyond recognition from some unknown original?

The temptation is great to hazard some speculation as to the genesis of this chapter (44), and to connect it with the strange fortunes of the *Annals,* as preserved in the two unique Medicean manuscripts; however, we will not put forth upon any such sea of conjecture, but will hug close the safe shore of Ferrero's avowal that the assumed "genuineness of the passage in Tacitus,"—so far from being "not open to reasonable doubt,"—confronts us with an insoluble riddle, "one of the greatest mysteries of universal history."

WILLIAM BENJAMIN SMITH.
TULANE UNIVERSITY, NEW ORLEANS.

# PHILOSOPHY IN FRANCE DURING THE LAST DECADE.*

TEN years ago I presented to the readers of *The Monist* a review of the philosophical works which had appeared in France during the preceding decennial period (1889 to 1899). I would like to offer them a similar sketch to-day. However, I shall not enter into specific criticism of the works as I did then, but shall limit myself to a simple review and shall merely mention certain names. My plan will be to indicate as far as possible the principle directions in which they are tending, the purposes which seem to control them, and to observe the sort of rhythm which impels workers in this field to treat their problems alternately according to different or even contradictory methods, which, nevertheless, end by correcting one another. Upon the vigorous impulses which lead us to attack the great questions face to face and in their entirety, follow the lesser ambitions which make us cling to details, to patient verifications, to minute analyses, even though occasionally proceeding by indirect paths.

* * *

The broad attempt at psychological interpretation of social facts—both political and economical—so brilliantly begun by the lamented Tarde seems almost abandoned since the death of its famous promoter.

Moreover it is true that his style was less suited to

* Translated for *The Monist.*

instruction than to personal research and that his vast syntheses can not always be accepted as such since they are often founded upon analogies which are too far fetched. But I have expressed myself before on this subject in these columns and I do not wish to be exposed to the charge of repetition.

After Durkheim, Tarde's most vigorous antagonist, had published his large works, he continued in *L'année sociologique* the application of the method for which he had formulated rules. Following him, his collaborators now direct their attention to the special processes of instruction and criticism; detailed studies abound in great number, particular questions are pursued as closely as possible (such as the study of sacrifice made by Hubert and Mauss); in short, research bears with preference upon precise facts definitely limited.

E. de Roberty, one of the combatants of the first rank, has now brought his voluminous work to a close. We might say that like Durkheim he differs from Comte, their common master, as much as he follows him. It has been his constant purpose to determine the subject matter of sociology, to discover in how far social facts are objective things, the material of abstract science or concrete, and how they may be studied apart from the subjective facts of consciousness. At this we are led to inquire whether psychology precedes sociology, or is itself derived from it, and in what measure—a problem of method and doctrine no less than of classification.

To Roberty there can be no doubt on this point. In his opinion psychology follows directly from sociology as a continuation of social data. He does not accept the extension of Ostwald's "energetic" laws to these data. They are only valid, he says, for composites (cosmo-biosocial), for concrete social data. But how can it be proved that these laws affect also the "social component" of these data?

In order to avoid all confusion it is important to draw distinctions with care. We must not interpolate the psychological method between the biological and the social methods for the psychological and social methods only duplicate each other. The social method constitutes alone the abstract method, the psychological method being merely its principal expression, or its simplest concrete externalization. This view which reverses the terms of the old relation will prevent us from falling back into the illusion either of the idealists or of simple materialism. The qualities of the soul will not directly explain social phenomena nor will mechanics furnish the direct explanation of psychical phenomena.

To sum up: Given psychical interaction as a special mode of universal energy, that is to say, the transformation of consciousness into cognition, of biological energy into superorganic energy, and we have the cause of what we call civilization.*

* * *

Nevertheless psychology, which thus becomes concrete for the sociologist, may be treated by psychologists as abstract. Or, if we prefer in order to avoid all contradiction of terms, psychologists have two chief methods of considering and investigating psychological data. They may legitimately consider those data (1) as detached from the individuals in which they are manifested, that is to say in general terms, by relating them to some leading or explanatory fact; or (2) as in the individuals themselves in the form of definite and particular phenomena.

According to the first of these methods we find general psychology preferably portraying either sentiments, ideas,

* Ostwald's energetics, a concept which solves the ancient antinomy between matter and energy, ought, according to Roberty, to be judged as a forward step of general logic, which evolves in some fashion at the same time that our collective (or socio-individual) experiences are increased. This approaches to some extent the concept of universal unity as logical or abstract monism, according to its philosophical conception.

or some other category of philosophical data in the light of an hypothesis or of a directing principle as Ribot has done in his "motive theory" or Fouillée in his "idea-energies" (*idées-forces*).

It was given to Ribot during these last years to accomplish the revision of the entire psychological domain. To his work, the most important which any psychologist has ever accomplished (as I have shown more than once in these columns), he now adds supplementary studies. Among these are his articles on the problems of affective psychology, and it is not necessary to point out once again the close relation which these bear to his general theory of the primacy of sensibility in contrast to the "intellectualist" views still defended by some psychologists.

Fouillée has continued to apply to the critique of psychological theories his principle of the "idea-energy" which is at the same time the "appetite" or "desire" of Spinoza and the "will" of Schopenhauer. His work cannot be put into the balance with that of Ribot; moreover the object of the two men is not the same. Fouillée presents a very general theory rather than attempting to write a psychology in detail, and proposes an interpretation of psychological data conforming to this theory, or, rather, to its application.

In certain respects it is not a good thing to have the study of psychical data depend too closely upon a philosophic point of view nor is it well for the observer to regard living reality in the light of his own prejudices or systems, because the new impressions that objects make upon him are confounded with former impressions in his mind and only an inaccurate and confused image can result. I do not mean in the least to imply that the doctrine, the initial hypothesis, should be a matter of indifference. Just as in chess there are moves leading nowhere that good players would never make, so in psychology there are points of view

from which data are seen but indistinctly or in a false light. Such in Ribot's eyes would be that of intellectualism. Doubtless it would be as great a mistake to look to strictly mechanical theories for the only possible systematization of psychological data. Those who, with Bergson, regard the data from the point of view of a metaphysical idealism, or with Dwelshauvers, of an improved spiritualism, have pointed out the faults of pure mechanism. Some new studies on the function and diseases of language have led scholars like Dr. Marie and Dr. Moutier to recognize that the difficulties of language do not arise from the nerve centers but from the mind itself, and that they are disorders of the intellect and not of the senses. Being physiologists, these men do not declare for the primacy of the intellect but keep within the field of their investigations. But the results of their researches (which have invalidated the premature theory of Broca) ought to show once for all that psychological data constantly take us into the presence of "functions" which are not explained by the simple play of certain elements that analysis has succeeded in detaching from them.

Nevertheless analysis is not shorn of its value, and partial or even imperfect syntheses mark the necessary steps. Works of detail remain in favor among psychologists as well as among sociologists. Thus Paulhan, completing his studies on character, has treated of the *Morale de l'ironie* and of the *Mensonge de l'art*; Binet has turned his attention to pedagogic problems; Pierre Janet, G. Dumas, and Sollier to pathological states, to the emotions, association, etc. Van Biervliet, the distinguished Belgian physiologist, has summarized and given an appreciation of the state of laboratory research in his interesting *Causeries psychologiques* and in his *La psychologie quantitative,* a book of great value.

To these names it is proper to add several others:

Flournoy, Dugas, Revaut d'Allonnes, Grasset, Hartenberg, Mlle. Toteyko and Mlle. Stefanowska (a fine work on *Grief*), etc. I am forced to pass these over since I cannot give a complete review at this time.

* * *

I must not return to the works of Souriau and Griveau but just a word to call them to mind may be in order.

When Souriau discussed "rational beauty" (*Beauté rationelle*) and gave to art the idea of "perfection" he surely touched bottom at a certain depth but the surface is constantly changing. One can only enter the protest that the artist aims at a certain perfection; his only concern is that he be understood on the conditions of this perfection, that he define the value of the various elements that enter into the work of the painter, the architect and the musician! Nevertheless I gladly grant that in this way it is possible to show more clearly the relations between esthetics on the one hand and logic and science, intelligence and sensibility on the other; in other words to throw a brighter light on the special problems of art.

Grieveau set himself the task of discovering the principles that govern the adaptation of our internal rhythm to the rhythm of objects. He has dealt with the vast subject as a sincere poet of nature, treating it in various forms in writings which do not savor of the schools nor of lessons performed or assigned. His pages abound with valuable observations and useful hints, and permit an insight into a metaphysics grounded on the laws of a universal rhythm.

There is a new author of undisputed ability named Charles Lalo who in his turn approaches esthetics by a trenchant critique of the experimental school (*L'esthétique expérimentale contemporaine*) and by original studies in music (*Esquisse d'une esthétique musicale scientifique*). I have given an account of his theory in two somewhat ex-

tensive articles in the *Revue philosophique* and shall here indicate only its most essential features.

Two considerations appear in the foreground. One is a development suited to art, an internal dialectic by which music would develop independently of the secondary external conditions to which almost exclusively writers like Taine and Guyau give emphasis. The other consideration, which would seem at first to contradict the preceding, has to do with the dominant influence of society; for society alone has created the "values" of art, has systematized and prescribed the technique, that is, the totality of qualities required in each age in order that a work be considered as "good." The theory of Lalo becomes thereby a sociological theory according to which social activity, differently understood than in the old theories of environment and of the race, is employed here in helping and supporting the evolution of art from within, in establishing and prescribing the results of the dialectic that governs its evolution.

I have tried to apply these principles to the other arts, but the development of painting or architecture, for example, seems to be more dependent on external conditions than that of music which offered a kind of privileged case; and above all the "value" does not seem so strictly and constantly a "collective" thing as Lalo, following Durkheim perhaps too closely, would have it appear.

One of the reasons why I have enlarged upon his work is that it afforded me an opportunity to treat anew the delicate question of the relation of individual psychology to the so-called "collective" psychology. This problem has a place in every chapter of psychology since we would know nothing of our feelings, our ideas, even our logic, without the influence of society and the long continued education of our species. We have seen that in their own way sociologists also admit the question when they dispute

the rank of psychology in a classification. In fact, this problem is not only interesting from the theoretical side, it constantly arises in practical affairs under the guise of reciprocal obligations on the part of the individual and the state, of anarchy and government, and, let us add, of traditional morality and the so-called morality "of nature."

* * *

No question is discussed with more feeling just now than that of morality. It is so closely connected with the religious question that they can hardly be separated. We certainly can not pass by with indifference the controversies bearing upon textual criticism, traditionalism and modernism, etc. They enter upon the subjects of authority, of the church, historical origin of Christianity and of the various religions. But whereas they have a direct interest for only a rather limited public the general diffusion of their conclusions on the conduct of life has suddenly assumed extraordinary importance.

There has been no dearth in recent years of works devoted to the criticism of ethics and its leading conceptions, some authorities professing to dispense with ethics entirely or to regulate and systematize it. Suffice it to name among the philosophers the principal writers that have treated the subject from a broad point of view, viz., Fouillée, Lévy-Bruhl and G. Belot. Neither their methods nor their philosophy are the same. One discusses the value and content of a system of ethics, another proposes a structure modeled on his own theory. I shall not enter into a detailed examination, keeping myself to the question itself taken as a whole. As a matter of fact, when I come down from the leading authors to the writers of manuals or to second rate men, I cannot help a feeling of distress. I feel too strongly the ridiculous side, I see too clearly the puerility, the vanity of these attempts when the strength of the

effort does not bear witness to a loftier thought by which they are inspired and supported. The death of all morality, at any rate of the old-fashioned morality, will perhaps be the "fine spectacle" of which Nietzsche dreamed, that is reserved for our remote, if not our immediate, posterity; but it is certain that the immanent ruin of all duty and virtue, the upheaval of the fundamental institutions on which our society rests, are facts that are hardly reassuring and from which even now we see disquieting results.

Duties have their birth in social life, obligation is based on habit. These as I myself have frequently said, are the two essential characteristics of a positive morality. Moreover, it is necessary that the duties be felt, that the habits be formed and retained. And here difficulties arise. Even assuming that what duties were necessary for the welfare of society could be agreed upon (which is far from probable), there remains the question of how to impose them. The systems of morals that would fain be scientific confess themselves powerless here. Religious morality alone, whatever its doctrine may be worth, exerts a real authority of efficient constraints, and the reason is that it bases its precepts on truths undisputed by those who accept them, that it makes its appeal to faith. But the act of faith which gives to religions their power has its genesis in historical circumstances that cannot be artificially reproduced. Here lies the difficulty of an ethics independent of dogma. Not possessing the means of creating the faith which would give it life, we must have recourse to the demonstrations of reason,—a support all too frail in the eyes of the majority of mankind!

There could be no greater madness, therefore, than to wish to suppress by force the religious school, as our Jacobins, theorists or politicians try to do, because it is at least one of the sources from which moral habits arise. Such men by their "state-catechism" taught by priests

*à rebours* pursue an illusory unity, a fallacious harmony of minds. They dread the competition of the free school and ward off discussion, which however is not disease but life.

* * *

Extremes soon meet their counterparts. A fairly active reactionary tendency has betrayed itself for several years in favor of metaphysics (inclining toward idealism or spiritualism) against scientific materialism, or rather against the unwarranted employment of mechanical explanations when these hide too conveniently the blocks over which science still stumbles. One party of our young men follows Poincaré, another proclaims Bergson as its leader. In Bergson's work this party hails a restored metaphysics set forth with the charm of poetry but basing at least its bold propositions and clever metaphors on minute psychological analysis and a penetrating critique of cognition or of ideas.

Bergson reproaches science for seeing only the *immobile*; he wants to seize upon and feel *motion*, to see nature in a flux, and to this end he intends to place himself *inside* of things, no longer *outside* of things,—a difficult operation that obliges us, since we cannot get away from the conditions of cognition, subjective or objective, to proceed at the same time by both analysis and synthesis, by science and divination. But does not this attitude amount to explaining the external by the internal, the internal by the external? Would it not lead us to conceive things under new figures and to express them by new names rather than to explain them in a light that would cause them to be seen in a different way and more clearly?

So it comes about that the notion of duration as defined by Bergson implies increase and creation in time, and the notion of vital impulse signifies the force included in evo-

lution and, for the time being, covers appetite and will. But I have no desire to summarize or criticize such an extensive and careful book in the space of a few lines. I merely wish to indicate the important place it occupies and the direction which its philosophy indicates.

I shall not return to Binet's endeavors, of which I have spoken on former occasions at sufficient length, along the line of the relations between body and soul; nor shall I revert to the works of Le Dantec. Neither biologists nor metaphysicians, in short, have succeeded in making us see more clearly into the phenomena of *consciousness, intellect* and *instinct*. All one can say is that, in spite of many failures, our researches have resulted in placing us in a truer attitude toward the problems of life and the spirit. And surely this is of itself no slight advantage.

At bottom the problem of cognition remains one of the leading questions of modern philosophy. But our philosophers approach it in a very different way from that of their forerunners, and the problem itself seems to have assumed a different form. Whereas formerly the endeavor was made to investigate the *means* of cognition and to define its modes and scope, the aim in our day is rather to criticize the *results* (Poincaré), to estimate the true value of the laws of science and the validity of its hypotheses—a sort of expectant attitude that has with some exaggeration been called anti-intellectualism. I would see anti-intellectualism most particularly in the mystic theories of the unconscious and of instinct (Bergson) arising out of psychological studies and tending in effect to limit and reduce the rôle of the intellect.

In this chapter I must also mention some exceedingly interesting writers, curious and original minds, such as Jules de Gaultier, A. Chide, Boex-Borel (*Le pluralisme*). The opportunity to make them better known to my readers may present itself some day.

It is necessary to add that historical studies, dealing with an entire period or with certain philosophers considered separately have likewise not been wanting? Besides the *Collection des grands philosophes* which is growing rapidly, it may suffice to mention the very considerable work of Joseph Fabre, who conducts us from ancient thought to "modern thought"; that of François Picavet, who covers the Middle Ages; that of H. Delacroix, devoted to the mystics; the Vinci of Duhem, and of Peladan; the Kant of V. Delbos, etc.

I ought likewise to mention the attempts at collective work undertaken by separate sections and commissions in the *Institut générale psychologique*. Studies have been made with varying success in the psychology of animals (Perrier, Bohn, Hachet-Souplet) and the phenomena of spiritism (the extended report of J. Courtier). Special problems in esthetics have been broached beginning with a study of visual memory in the painter.

This activity is encouraging. I cannot, however, forebear a feeling of sadness at the approaching disappearance of the strong generation to which we owe the magnificent impulse and fine work of the last thirty years. A new generation is at our door that will gather the harvest in its turn. It will no doubt apply itself to testing the results achieved and to revising our provisional conclusions. May it succeed in adding largely to our common store!

LUCIEN ARRÉAT.

PARIS, FRANCE.

## THE UNVERIFIABLE HYPOTHESES OF SCIENCE.

MORE and more the conviction grows and spreads, that science is or is to be the light of the world. The one supreme gift of education is or is to be the scientific attitude of mind. The problem of problems, therefore, is to understand, to make lucid, to make conscious, to make transmissible the essentials of scientific thinking.

The bond of harmonious world-life is the scientific habit of mind. How horribly we have been hypnotized by words and out-worn creeds, while even yet eighty percent of us die from causes completely preventable.

The marvelous objective contributions of science flare up on every hand about us. The chemist's coal-tar colors are not more vivid than the lurid light of electricity, now a household fairy with telephone and electric smoothing iron. While the X-rays reveal our very bones and wireless telegraphy pierces the blackest of ocean's tempests, we are unastonished while Sir William Ramsay and Madame Curie debate whether the dream of the alchemists, the transmutation of metals, has come true.

But these gemmed palaces uprising at the rubbing of the Aladdin's lamp of science, looked at only from without, unmastered, lend themselves only too readily to the aid of the false magician, dealer in the magic of words.

Calling Christ scientist was the shrewd appropriation and utilization by Mrs. Eddy of the universally growing conviction of even the densely unscientific that science is the hope of the world. Willingness to try the swallowing

of a cholagogue with so sympathetic a trade mark was actually stimulated by the real wonder-working of true science. Men and women can be charmed with words. Things, much more stubborn, bow only to the sovereignty of one kind of thought, the scientific. What then are the identifying characteristics of this the only lawful prince?

For example, wherein differ these three beliefs, the belief of the Coreans that epileptic fits are demoniacal seizures to be treated by trying to cast out the devils, the Mrs. Eddy contention that there is no sickness and the epileptic fits are only illusions caused by malicious animal magnetism, a suppositious entity relief from which she has actually sought in our law courts, and finally the position of the Japanese army-surgeons that an epileptic fit is a phenomenon produced by an abnormal explosive discharge of nerve force overflowing proper channels, self-limited as the flood from a bursting water tank, not stopped by the exorcising of a demon? An epileptic seizure is often preceded and heralded by a distinctly recognizable aura. Is the one who feels the oncoming stroke, to pray, to telephone for the police, or instantly to snuff up the nose the fumes from an uncorked bottle of nitrite of amyl?

From nothing assumed, nothing can be proved! Every conclusion supposes premises. But even the learned have heretofore not realized that the necessary hypotheses of science are of two distinct kinds. Every one has recognized those hypotheses which are valuable *precisely* because they are either verifiable or else refutable through definite appeal to the tests furnished by what we have called experience and experiment. However, what we call experience and experiment is not all. No scientist has ever been able to get on without hypotheses. But the essential thing is never to make them unconsciously, and the scientist of the past has here been a sinner.

The epoch-making revelation is that among the scien-

tist's necessary assumptions, both conscious and unconscious, are some of a kind hitherto unrecognized, of a genus wholly different from what he thought them, hypotheses wholly and forever indemonstrable, which experience and experiment, however interpreted, are eternally inadequate to prove. Once pointed out, the antithesis, the contrast between these two species of scientific hypotheses is strikingly abrupt. The routine scientist, taken unawares, would be tempted stoutly to deny the scientific importance, yea, the very existence in science, of hypotheses of this newly revealed type. What! a scientific hypothesis by its very nature incapable of proof! Far be it from him! Yet to these unrecognized friends he has owed, he owes all his success. From their stimulus, with their guidance under their protecting wings he has done all his work toward interpreting his experiments, his experience, his world.

Such a hypothesis, yet so long misunderstood, is Euclid's celebrated parallel postulate, familiar in Ludlam's form: Two straight lines which cut one another cannot be both parallel to the same straight line.

How easy this hypothesis! Why not prove it? Almost every man of science throughout the ages did try to prove it. Says Poincaré: "What vast effort has been wasted in this chimeric hope is truly unimaginable."

At last comes the new step. Says Lobatchevsky: "In the uncertainty whether through a point there is only one straight coplanar with a given straight yet nowhere meeting it, we will assume it may be possible that there are still other straights which do not cut the given straight, though coplanar with it and through the given point."

Here then we have Euclid's hypothesis characterized as a scientific assumption forever indemonstrable and therefore subject to direct, explicit contradiction, subject to replacement by an assumption flatly contradicting it.

Bolyai speaks just as explicitly of the system of geometry resting upon Euclid's hypothesis, and the system founded on the contrary hypothesis, that there are coplanar straights not both perpendicular to any third, yet which nowhere meet, straights which are asymptotes each to the other. And this Bolyai geometry is of a logic nowise inferior to the Euclidean.

Is, then, the Euclidean geometry true? This question, says Poincaré, has no meaning. As well ask whether Cartesian coordinates are true and polar coordinates false. But says Professor Roe, the sun will rise to-morrow and must rise in time and space.

Too late, my dear Professor, too late. Since the hypothesis of Copernicus, the sun does not rise, the earth rotates. Since the hypothesis of Bolyai, if it rose in geometric space it might be Lobatchevsky's, but it does not rise in a geometric or conceptual space. Such space is one, empty, homogeneous, continuous, unbounded, perhaps infinite, infinitely divisible, identical, invariable. But the where of physical motion, if we still insist upon calling it some kind of space, is perceptual space, hence multiple, filled, heterogeneous, perhaps continuous only for perception, perhaps finite, not infinitely divisible, variable. Our physical world is neither in Euclidean nor non-Euclidean space, for these are conceptual constructs. Geometric space is a construction by the intellect, made by methods entirely analogous to the ordinary ways in which we achieve our selfish purposes, and call the achievement truth.

The certainty of the science of geometry is only the certainty of deduction from hypotheses, and because of the final necessity of unverifiable hypotheses, we must now have some criterion other than proof. Here is one: Of alternative hypotheses is to be chosen the simplest now for us.

Man is the measure of all things. The debate, what

is truth? is a wrangle unless it gives precedence to the kenlore question, How can *reality* like a new planet swim into my ken? Then we find our knowing is ever subject to our wishing. As Schiller says: "At a blow it awards to the ethical conception of *Good* supreme authority over the logical conception of *True* and the metaphysical conception of *Real.* The Good becomes a determinant both of the True and of the Real. Our apprehension of the *Real,* our comprehension of the *True,* is always effected by beings who are aiming at the attainment of some *Good,* and it seems a palpable absurdity to deny that this fact makes a stupendous difference." That is clung to as real which has entangled itself in our emotional life. Could you induce a dear old lady to give up her conviction of the importance of circumcision and the devil? And I agree with her as to one and beg to differ as to the other.

How well I remember that when it was my privilege to study astronomy with Newcomb he showed that the Ptolemaic hypothesis was perfectly adequate for the calculation of eclipses, only too cumbersome as compared to the Copernican, while on the contrary the three Kepler laws offer no definite or complete solution of the problem of the movements of the heavenly bodies, their importance being that of the fabled apple, they hit the tremendous head of Newton.

John Bolyai it was who in 1823 first wrote down that quality of an infinite aggregate which in these latter days of tardy appreciation we have adopted as its definition: "An infinite aggregate is one equivalent to a part of itself."

You know the algebraic paradox that two equals one, an excellent way of justifying our convention that you must not divide by zero; but though only every other integer is even, yet for every number there is an even number,—the whole is not greater than its part—for every point on a yard there is a point on a foot.

The hypothesis of the uniformity of nature is unverifiable. Here it is: Reproduce all the conditions of a certain phenomenon, that phenomenon will reappear. Of this Dr. Carus has lately said: "It would be useless even as a working hypothesis; for, as Mrs. Warren truly explains, we can never reproduce the very same conditions a second time."

But Royce of Harvard, in his introduction to my translation of Poincaré's *Science and Hypothesis*, says of what, to fix the ideas, I here call okapi hypotheses:

"These are far less frequently recognized in a perfectly explicit way as useful aids in the work of special science. One usually either fails to admit their presence in scientific work, or else remains silent as to the reasons of their usefulness. Our author's treatment of the work of science is therefore especially marked by the fact that he explicitly makes prominent both the existence and the scientific importance of hypotheses of this second type. These hypotheses which can neither be confirmed nor refuted by experience appear partly (like the conception of 'continuous quantity') as devices of the understanding whereby we give conceptual unity and an invisible connectedness to certain types of phenomenal facts which come to us in discrete form and in a confused variety; and partly (like the larger organizing concepts of science) as principles regarding the structure of the world in its wholeness; *i. e.*, as principles in the light of which we try to interpret our experience, so as to give to it a totality and an inclusive unity such as Euclidean space, or such as the world of the theory of energy is conceived to possess. Those aspects of science which are determined by the use of the hypotheses of this second kind appear in our author's account as constituting an essential human way of viewing nature, an interpretation rather than a portrayal or a prediction of the objective facts of nature, an adjustment of our conceptions of things to the internal needs of our intelligence.

Unverifiable and irrefutable hypotheses in science are indeed, in general indispensable aids to the organization and to the guidance of our interpretation of experience. Characteristic remains the thought that *without principles which at every stage transcend precise confirmation through such experience as is then accessible the organization of experience is impossible.* They may therefore be described as hypotheses that, while lying at the basis of our actual physical sciences, at once refer to experience and help us in dealing with experience, and are yet neither confirmed nor refuted by the experiences which we possess or which we can hope to attain."

Three special instances or classes of instances may be used as illustrations of this general type of hypotheses. They are: (1) The hypothesis of the existence of continuous extensive *quanta* in nature; (2) The principles of geometry; (3) The principles of mechanics and of the general theory of energy. In the case of each of these special types of hypotheses we are at first disposed, apart from reflection, to say that we *find* the world to be thus or thus, so that, for instance, we can confirm the thesis according to which nature contains continuous magnitudes; or can prove or disprove the physical truth of the postulates of Euclidean geometry; or can confirm by definite experience the objective validity of the principles of mechanics. A closer examination reveals the incorrectness of all such opinions. Hypotheses of these special types are needed; and their usefulness can be empirically shown. They are in touch with experience; and that they are not merely arbitrary conventions is also verifiable. They are not *a priori* necessities; and we can easily conceive intelligent beings whose experience could be best interpreted without using these hypotheses. Yet these hypotheses are *not* subject to direct confirmation or refutation by experience. They stand then in sharp contrast to the scientific hypotheses of

the other, and more frequently recognized, type, *i. e.*, to the hypotheses which *can* be tested by a definite appeal to experience.

The central problem of the logic of science thus becomes the problem of the relation between the two fundamentally distinct types of hypotheses, i. e., between those which cannot be verified or refuted through experience, and those which can be empirically tested.

One value of unverifiable and irrefutable hypotheses of this type lies in the sort of empirical inquiries which they initiate, inspire, organize and guide. In these inquiries hypotheses in the narrower sense, that is, trial propositions which are to be submitted to definite empirical control, are indeed everywhere present. Yet without the "leading ideas" of science, that is, its principles of an unverifiable and irrefutable character, the hypotheses in the narrower sense would lack that guidance which the larger ideas of science give to empirical investigation."

And now from the cavayard of young giraffe and okapi found new-prancing in the fair field of modern dynamic, following here Poincaré's delineation, I shall cut out two for exhibition. *Voilà!*

What characterized the Newtonian mechanics? Simply this: Take a body at rest; give it an impulse, that is, impress on it a given force for a given time; the body starts to move and acquires a certain velocity. The body having this velocity, if we again impress the same force during the same time, the velocity will be doubled. If we still continue, the velocity will be tripled after we shall a third time have given the same impulse. Thus beginning again a sufficient number of times, the body will end by acquiring a very great velocity, which could surpass any limit, an infinite velocity.

In the new mechanics, on the contrary, we suppose it impossible to give to a body starting from rest a velocity

greater than that of light. What happens? Consider the same body at rest; give it the same impulse as before; it takes the same velocity. Repeat again this impulse, the velocity will augment, but it will not be doubled. A third impulse will produce an analogous effect, the velocity augments but less and less; the body opposes a resistance which becomes greater and greater. This resistance is inertia, is what we commonly call mass.

Everything happens, then, in this new mechanics as if the mass was not constant, but increased with velocity.

We may represent the phenomena graphically. In the Newtonian mechanics, the body takes after the first impulse a velocity represented by the sect $Ov_1$; after the second impulse, $Ov_1$ increases by a sect $v_1v_2$ equal to it. At each new impulse, the velocity increases by the same qantity; the sect representing it increases by a constant length. In the new mechanics, the velocity-sect increases by sects $v'_1v'_2$, $v'_2v'_3$,... which are smaller and smaller and such that we cannot exceed a certain limit, the velocity of light.

How have we been led to such a conclusion? Have we made direct experiments? The divergence would show only for bodies at high velocities; then alone the indicated differences would become sensible.

But what is a very high velocity? Is it the speed of an automobile going at the rate of 100 kilometers per hour? On the road we go wild at such speed; but for the present view-point this is a snail's pace. Astronomy serves us better. Mercury, the speediest of the heavenly bodies, also goes about 100 kilometers, not per hour but per second; but still that is not quick enough; such speeds are too slow to reveal the differences we would observe.

I shall not speak of cannon balls. They are faster than automobiles, but much slower than Mercury. But you know we have discovered an artillery whose projectiles are

quicker far: I mean radium, which shoots out energy projectiles, in every direction. The rapidity of the shot is greater far; the initial velocity is about a hundred thousand kilometers per second, one-third the velocity of light. The caliber of the projectiles and their weight are, it is true, less formidable, and we must not count on this artillery to increase the military strength of our armies. Can we experiment on these projectiles? Such experiments have actually been undertaken. Under the influence of an electric charge, of a magnetic field a deviation happens which permits taking account of inertia and measuring it. It has thus been established that mass depends upon velocity, and the following law has been enunciated: The inertia of a body increases with its velocity which remains always less than that of light, 300,000 kilometers per second. In other words, for this non-Newtonian dynamics a constant force acting upon a moving body does not impart equal increments of velocity, equal accelerations, in equal times, say in each successive second; but the accelerative effect decreases as the velocity increases, and this has for limit the velocity of light. There can be no motion swifter than that of light, about 186,330 miles per second, a very tiny number, while on the other hand the mass of ever so little a body approaches absolute infinity as the measure of its speed approaches this trivially tiny number. Surely this dwarf and giant annex to the staid old Sir Isaac Newton museum, though masquerading as the outcome of experiment, is as bizarre as the okapi of Sir Harry Johnston, defined in the last of the two splendid new volumes of the *Century Dictionary* as having the upper parts dark purplish brown; forehead and ears reddish; sides of face nearly white; legs buff, the flanks and upper parts marked with horizontal blackish stripes resembling those of a zebra,—certainly a color scheme run mad.

Yet after all, this non-Newtonian mechanics owns an-

other hypothesis not less surprising. A body in motion of translation undergoes a deformation in the line of its displacement; a sphere for example, becomes a species of flattened ellipsoid with the shorter axis parallel to the translation. If such a transformation is not seen every day, this is because it is so minute as to be almost imperceptible. The earth revolving in its orbit deforms itself about one two hundred millionth. To observe such a phenomenon instruments would be needed of precision extreme; but were their precision infinite it would not help, because, carried themselves in the movement, they would undergo the same transformation. We should see nothing. The meter we could use would shorten like the length we measured.

Yet even this has not been accepted as settling the species of this bizarre creature. It is claimed that Michelson has shown it to be not okapi but giraffe by verification, and largely this won him the Nobel prize, forty thousand dollars.

Finally, the notion of constant mass of a body having vanished, having evaporated, what becomes of Newton's law of gravitation?

Motion plays havoc with it, and Lorentz has replaced it by a new law of attraction containing the velocities of the two bodies as parameters.

The greater the velocities, the greater the difference between Newtonian and non-Newtonian.

Now of all the planets Mercury has the greatest velocity, and just Mercury presents an anomaly not yet explained: the motion of its perihelion is more rapid than the motion calculated by Newton's law. The acceleration is about 38″ too great. Now the Lorentz law of gravitation would make the acceleration greater than that given by Newton's law.

GREELEY, COLO. GEORGE BRUCE HALSTED.

## FORMAL THOUGHT THE BASIS OF KENLORE.

EPISTEMOLOGY is one of the most ponderous words in the English language, but it can easily be replaced by the simple Saxon term "kenlore," which describes the process of cognition and would thereby explain how things come within the range of our ken. Our readers will find the term used in Professor Halsted's most interesting article on "The Unverifiable Hypotheses of Science," published in the present number of *The Monist,* where he rightly claims that there are certain hypotheses which "are yet neither confirmed nor refuted by the experiences which we possess or which we can hope to attain." One of them is the parallel postulate on which Eulidean geometry rests, and he is well aware of the fact that there are other geometries based upon other assumptions which are just as "unverifiable and irrefutable," and he calls them "okapi" hypotheses, comparing them to that rare giraffe species called *Ocapia Johnston's Sclater.* Professor Halsted's treatment, based on Poincaré's *Science and Hypothesis,* is quite instructive because he raises an important problem and ventilates it in his own ingenious way. We will add, however, that on several salient points we do not agree with him, and so we will here improve the opportunity of presenting our own views in contrast to his.

The difference between our views and those of Professor Halsted are perhaps insignificant when compared to the agreement between us. Like him we believe "that sci-

ence is to be the light of the world," and it may be that we only explain the facts on which he, together with Professor Poincaré, insists.

Professor Halsted enumerates his unverifiable hypotheses as, "(1) the existence of continuous extensive quanta in nature, (2) the principles of geometry, (3) the principles of mechanics and of the general theory of energy."

Professor Halsted distinguishes between unverifiable hypotheses and the real scientific hypotheses, saying that the former can neither be proved nor refuted while the latter are subject to verification. He overlooks, or at least tacitly passes by, the fact that these so-called unverifiable hypotheses are at the bottom of all scientific thought. They are, what Kant calls transcendental, the condition of cognition itself, and thus enter into every part of the fabric of our thought. For this reason mystics have actually claimed that all knowledge is unverifiable, and what Professor Halsted calls scientific hypotheses, which, he claims, are subject to verification, presuppose that the other more general problems of the unverifiable hypotheses have been settled. They refer to those special problems in which all interest is concentrated on the evaluation of definite facts of experience while the underlying general principles of thinking are taken for granted. Nowhere in our thought can we dispense with the general principles of the formal sciences.

Professor Halsted does not seem to be aware of the fact that all of his so-called unverifiable hypotheses refer to the underlying principles of the formal sciences, and they will be disposed of by a solution of the problem as to the nature of form and formal thought. We have discussed the problem of formal thought repeatedly and will here restate a summary of our solution, which takes a middle ground between the Kantian theory of the *a priori* and experimental sensualism as represented by Locke and his followers,

though we must add that upon the whole we follow Kant more than the sensualists because Kant saw the problem without solving it, while the sensualists attempted a solution without being familiar with the problem itself.

Briefly stated the situation is this. A sentient being becomes acquainted with the objective world through contact with surrounding things. Contact makes impressions which are felt by the senses and in their totality are called experience. The essential part of experience consists of feeling, and if we refer to the feeling alone we speak of it as sense experience but all the several experiences are of different forms, yea the variety of form is the most obtrusive difference by which the various objects are recognized. Every form makes an impression of its own. It makes its own path and is registered somewhere in the cerebral substance. A new impression follows the track into which it fits, and in awakening the memory traces which are like it, it is felt to be the same as they. This is the origin of representative thought, of concepts which have a meaning. In the higher stage of development a thinking being learns to make abstracts. He learns to take notice of qualities, and one of the most important qualities is the quality of form.

The term "form" as here used, implies not only external shape but also internal conformation or structure. It also comprises juxtaposition of parts or interrelations between things, and it is but natural that the highest abstract of this kind results in a conception of pure form, or the mere possibility of interrelations. This condition is produced by abstraction which empties our experience of all sensory elements, leaving only a potentiality for interrelational constructions, a void which in my *Foundations of Geometry* I have called "the field of anyness."

Here lies the foundation of mathematics. The mathematician does not start from nothing but from this void

which has been produced by clearing away all particularity, thus leaving a homogeneous field of universality.

It will be noticed that all the most important axioms of mathematics as well as the main principles of Aristotelian logic are unconsciously derived from this abstract notion of pure form. This void, this field of anyness, has been derived from the facts of experience, but the purely formal sciences are mere mental constructions.

The notion that the mathematician starts from nothing is wrong. The field of his operations, the void, has been abstracted from experience and possesses the potentiality of relationships from which particularities (matter and energy) are rigorously excluded. This confers by indirection definite and positive qualities upon the void, which are homogeneity and universality. This means that a definite construction remains the same wherever and whenever it may be made, and it applies to any possible configuration of the same kind. This quality we have called "anyness," and it is obvious that this anyness of the formal sciences, being due to our own making, can neither be confirmed nor refuted by experience.

Properly speaking anyness is not an hypothesis. It is the result of a mental operation; it is a product of abstraction, and the data from which it has been derived have been furnished us by experience in the broadest sense of the word. Accordingly in one way the purely formal sciences are based upon experience, and in another way they are in the Kantian sense *a priori* constructions.

Experience is of an objective character, and thus the abstraction of pure form is ultimately derived from our notion of the objective world, yet the general idea of pure form furnishes only the condition for the construction of the formal sciences. The real execution of the work is done by operations of the mind and so this part is purely mental or subjective.

The strange thing about our purely formal thought is the fact that no knowledge is possible without it. It is the condition of any knowledge, and this feature of it is called by Kant transcendentalism. As all things are configurations, so the mind itself originates from relational functions by distinguishing between forms, by taking note of interrelations, by classifying types as genera and species, by tracing the interdependence of events, etc., and the principles of all these activities are identical with the principles of formal thought.

From these considerations it appears as a matter of course that being of a purely formal character the general principles of the purely formal sciences are, as Kant rightly recognized, the conditions of all experience, or, to use his term, they are transcendental. They can not be derived from the data furnished by the senses and so they can neither be confirmed nor refuted by experience.

The data of the senses are always particularities, but the fundamental principle of the formal sciences is the idea of universality, which does not exist in the world of concrete things. If we so please we may call the homogeneity of the void an assumption or, with Professor Halsted, an unverifiable hypothesis, but these names convey the idea that the principle of universality, the idea of anyness and whatever may be implied thereby are arbitrary notions, that they are unjustified and unjustifiable, while to any one who has followed our arguments this is obviously far from the mark, and even Professor Halsted grants that they are "not merely arbitrary conventions."

If we bear in mind our solution of the problem of form and formal thought, many difficulties which have puzzled scientists and philosophers and also mathematicians admit of an easy explanation. One of them is the problem of the irrational, another the problem of the infinitely great and the infinitely small, and we will in this connection refer

to our prior article in *The Monist* for January, 1910, on "The Nature of Logical and Mathematical Thought," especially the part written in reply to Prof. Bertrand Russell (pp. 46 ff.).

The objectionable feature of infinitude originates mainly through our neglect to regard mathematical magnitudes as functions. Every number is really the product of a function, and infinitude as well as zero are also numbers. All the zeros and all the infinitudes are not necessarily equal, for their value depends upon the function by which they have been produced. It would be a mistake to regard all infinitudes as the same regardless of their meaning and origin. By an infinitude we understand a function which can never be completed. If we consider infinitudes as objective things that have been completed we become involved in contradictions, by which we will naturally be puzzled, just as is the man who tries to catch his shadow, or the Chinaman who turns around to see his queue. The definition which declares that "an infinite aggregate is one equivalent to a part of itself" is an ingenious paradox, and we regard it as only relatively true. If it were taken seriously it would lead to mysticism.

Whether or not we can call the theorems of the formal sciences "*a priori* necessities" depends entirely upon our definitions both of *a priori* and necessity. If we accept Kant's meaning of those terms, purely formal theorems are certainly *a priori* necessities. Every one, if it has been correctly formulated, is on its own ground necessary. But we have called attention to the fact that there are certain degrees of *a priori*. There is the *a priori*, first, of logical, and then of geometrical constructions. The former is a static *a priori* referring to stationary relations among logical types; it is the *a priori* of being. The latter, a dynamic construction in which the possibility of pure motion is presupposed, is the *a priori* of doing.

The domain of the *a priori* can be more or less rigid, and when we come to the Euclidean system of homoloidal space in which two parallel straight lines will cut only if produced to infinity, we may construct other geometrical systems in which this principle of parallel lines does not hold. They are just as purely mental constructions as is Euclidean geometry, yet besides the giraffe there may also exist an okapi, and when we construct the geometry of the even plane we must grant that there are other geometries possible, such as the geometry of the sphere, of the pseudosphere, of four-dimensional bodies, of curved space, etc. If our systems of purely formal thought are mental constructions, it stands to reason that we ought to be able to create different systems based upon different principles.

We do not deny the possibility of other geometrical constructions than those of Euclid, but we regard them more as evidences of the fact that geometry is a mental construction, than that other assumptions will prove as useful or as applicable to reality. And so it is but natural that these variations have excited the curiosity of only scholarly minds who have little or no interest in practical affairs and delight in the idea that there are vast regions of possibilities which have never been opened up to this commercially minded generation. It can scarcely be denied that the systems of Bolyai and Lobatchevsky command a purely theoretical interest, and that so far as the pragmatic issues of life are concerned they may be regarded as still-born children of the genius of mathematics.

From this standpoint the name "okapi" which Professor Halsted has chosen for these theories seems very appropriate, for the okapi is an animal which is on the verge of extinction. The fate of this animal is tragic, for it has scarcely burst into fame when we know that it will soon disappear again.

For those who are not specialists in zoology, I will say

that the okapi has been known only since 1900. It lives in remote parts of the Congo Free State and being very shy it can be trapped by the natives only in pits. It is practically a stunted giraffe. Its forefeet are shorter and its neck less high than those of its more favored cousins. In place of horns it has mere buttons, and its skeleton most resembles those extinct primitive types of its species which from the places where they have been found, in Hellas and in Samos, have been named Helladotherium and Samotherium. Naturalists have become assured of the existence of this rare animal through its fur and skeleton, because it has been impossible to bring any living specimen within the sight of the white man. The probability is that the okapi will soon join the choir invisible where it will be in the company of the Helladotherium and the Samotherium.

As the okapi is a mere deviation from the giraffe type, so the okapi theories of mathematics are in principle like their better known cousin, Euclidean geometry. They are merely a variety which however proves less fit for survival. The okapi will have disappeared by the time civilization has reached to its present abode.

I learn to my surprise from Professor Halsted that the word "okapi" has only recently been introduced to the English speaking public in the new appendix of the *Century Dictionary,* whereas the continental lexicons have been familiar with it since the appearance of the first travelers' reports about the existence of this strange beast.

It is true enough that "the debate 'what is truth,' is a wrangle unless it give precedence to the kenlore question," but we would deny Professor Halsted's assumption that "we find our knowing is ever subject to our wishing." Reality intrudes upon us and we become acquainted with facts whether or not we wish to have any acquaintance with them, and their nature does not depend upon our desire.

The facts are that the thinking subject, being part of

reality, is in constant interaction with it, and the problem is, how did the thinking subject originate from reality and how is a representation of reality possible in the thinking subject? This, as we have stated, is answered through the formal sciences. The formal sciences are possible because the most significant attribute of reality is form, and having gained a general knowledge of pure form through abstraction from reality, the thinking subject constructs systems of pure form which, when we try to describe reality, can be used as methods of cognition for measuring, counting, and tracing interrelations.

Kant wondered why our notions of pure form should tally with the conditions of the objective world, of nature, of reality; but this fundamental problem of kenlore is solved if we bear in mind that the general notion of pure form has been derived through experience from the objective world.

Formal thought is the origin of cognition and it is applicable to objective existence because form is the essential feature of all things. It is not an accident that the natural laws (e. g., Kepler's and Newton's laws) are summed up in "formulas" and that universals of any kind are best described by the word "uniformities." Science practically consists of classifying forms, of noting interrelations and tracing transformations.

Even the law of the conservation of energy is based upon this same foundation. It is a purely formal statement, for it simply means that nothing originates and nothing is annihilated, all processes of nature are transformations. The law of conservation of matter and energy is as purely *a priori* as the propositions $1 + 0 = 1$ and $1 - 0 = 1$. It can neither be refuted nor proved by experience, because the idea has not been derived from experience but is a product of mental reflection, the result of pure thought.

The same is true of causation which is only the positive

aspect of the law of transformation of which the law of conservation of energy is the negative counterpart. We can trace the concatenation of cause and effect, but we can never prove its universality from experience.

Form is a feature of reality and formal thought originates in thinking beings in response to the actions of the form-conditions of their surroundings with which they become acquainted by experience.

The systematic character of the formal sciences is of our own making, but the conditions of these mental constructions have been quarried out of the mine of experience, and so our conception of form is merely the picture of form in the objective world, as it is mirrored in the human mind.

We conclude this exposition of the part which ideal constructions play in kenlore by an example. We pin a silken thread down in two points and move the point of a pencil at its stretched end. The line resulting from this operation turns out to be an ellipse and ellipses are the paths of the planets. We study the nature of ellipses and formulate the theorems which we learn from the observation of our constructions and when we watch the motions of the planets in the heavens we can by the help of the geometry of ellipses predetermine the progress and all further positions of the planets.

It is a strange fact that these constructions made of ideas of pure form can be so helpful. They serve us as a key to experience, yea these purely formal thoughts are the mentality of our mind. They furnish the method by which sense impressions change into intelligible experience, and the elements from which they grow, being notions of pure form, can not be traced in the sense elements of experience.

The data of sense experience furnish particular facts but not the principle of universality. They are single items, but not the method according to which they appear as instances of general types. They are definite events or concrete

things, not laws, nor norms which would explain why they happen to be such as they are and what they would be like if in one way or another conditions were changed. The latter, laws, principles, methods, are mind-made; the former, the facts of experience, are nature, and nature is a play of transformations.

The laws of pure form are mind-made, but mind in its turn is nature-made. Sentient substance originates and nature impresses its own character into its fabric. There is first a sensing of concrete forms, then a recognition of pure form (that is to say, of form in abstract thought, of form in and by itself) and finally we have the methodical construction of systems of pure form.

The interrelations and interactions of feelings, their formal feature, is what we commonly designate as "mind"; and a systematized conception of them is in a word called "reason." There is no reason, no argumentative faculty such as is human reason, in nature, but there is a formative cosmic order determining all the particular facts of objective existence, and of this cosmic formative order human reason is an echo. From this norm which dominates the world and which is reconstructed in our mind we derive those principles of all our purely formal methods, our principles of logic and logical necessity, of universality, of our fundamental conditions for mathematical thought and geometrical constructions, and here accordingly lies the cornerstone of kenlore.

EDITOR.

# CRITICISMS AND DISCUSSIONS.

## TRUTH AND NATURE.

I.

Of all the myriad idols which men have shaped them of their imaginings none stands forth so austere, so august, and so transcendently elusive as truth. We are wont to think of the human mind as demanding in the objects of its enthusiasms a certain concrete vividness, sense and emotion wrought upon in unison. And indeed, when we contemplate the long pageant of by-gone worships, we do find therein sensuous color and brilliancy: the pantheons of the nations, the symbols of cult and creed, are the ornate illumination of the scroll of mental history. Nevertheless, upon reflection, we perceive clearly that the showy outward appeals are no real clue to the enthusiasms they arouse. For these appeals are utterly impermanent, pantheon giving way to pantheon, symbol to symbol, with kaleidoscopic ease of mutation; but the motive which yields in turn to the sway of each, the zeal and veneration of the religious spirit, ever remains, unabated and unabashed through all the change. Surely this motive—able to withstand so oft-repeated overthrow of its dearest idols—must spring from an instinct deep-wrought in the human fibre; it must have its source in some perennial prepotency of man's disposition and its final reason in the laws of life and mind—aye, in the very essence of that Nature which has brought into being life and mind.

And obviously there is, through all the change, a constant factor. It is a factor without which the development of a superbrute intelligence must have been forever impossible, for it is the key and support of the building human mind. This factor is belief in truth. And I mean not merely belief in the truth of each seeming revelation as it comes,—not merely sincerity of faith, though this is an evident corollary. But what humanizes intelligence is belief in the worth of truth for its own sake; it is belief in true thinking

as the only possible mental equipment for successful living; and it is such belief as is ready at any time to reject a revelation that fails in the test of experience and to resume a doubting and troubled search for that fond of verity which, however unattained, will yet never suffer denial.

The strength of this belief may be estimated from the devotion inspired by its object. Love of truth is the greatest, as it is the least conscious, of man's passions. Not only is it displayed in just and temperate pursuit of knowledge, but often in blind and bloody defense of errors: for error is simulated truth and is cherished only because it presents itself in truth's guise; heretic and heretic-hunter are alike at least in honest zeal, and in our admiration for the noble courage of a Bruno, preferring death to a stain upon reason, we need not utterly condemn in his opponents the grim determination that their truth must prevail. "The soul," says Plato, "has a faculty of loving truth, and of doing all things for the sake of it." In the history of the world it would be difficult to find any ideal that has profoundly stirred men's minds which has not been regarded as a special and superior manifestation of truth: Crusades, Renaissance, Reformation, Enlightenment, each betokens a new and exalted devotion to belief, and the warring and proselytizing of sects and creeds, in philosophy, science and art as well as religion, are but recurrent testimony to the intensity of earnestness with which men sacrifice and die for their convictions.

Perhaps the extreme type of this devotion is to be found in the characteristically modern pursuit of knowledge for its own sake, in that purely intellectual zeal which is the apotheosis of curiosity. Curiosity is at root a utilitarian affection of mind; for, while it is easy to be perilously interested, on the whole an inquisitive prying into environment is the condition of healthy caution and wise adaptation. In the primitive stages of human history, where experience is all concrete and the problems are immediate needs, acquisition of knowledge is perforce mainly incidental to impulse and appetite. But a purely speculative interest in the "hang" and "go" of things is not tardy in developing: Bushmen paintings are more than highly naturalistic pleasurings of esthetic fancy; they are nature studies in a true modern sense, the product of a lively impersonal interest in environment. Now it is just the mastering of the "hang" and "go" of the world that makes human living so exceptionally efficient; men control nature by finding out her hidden catches and springs; to discover general rules is to capitalize experience and live

on its income, to have reserve funds in time of need. And herein lies the grounding in the laws of life for the development of such a mental trait as curiosity and such a function of mind as precise knowledge.

But the conception of knowledge as a mere instrument, as a condition of biologic well-being tending to preservation and survival, is a late achievement of reflection. It is only in its maturity that reason begins to understand and take into account its own motives and instincts;—indeed, the very essence of "instinct" is "rational impulse" with the "rational" element suppressed in consciousness for the economizing of energy. The instinct of curiosity is no exception. Hardly yet is it emerged from the impulsive stage, and we may view that type of mind in which it is at once most impulsive and most powerfully developed—the scientific mind, the mind eager for knowledge for the sake of knowledge,—as an extreme specialization of mental power for the good of the race: it is to this mind that we owe the profoundly practical and efficient body of knowledge which is coming more and more to guide sane human endeavor and it is from this mind that we derive that degree of supremacy over physical environment which promises to bring mankind to a hale and hearty age. In its elementary phases curiosity is apt to be intensely practical; its concernments are directly at hand; it answers to near needs. But in order that mind might attain a truly generalized dominion, in order that the instrument might be rendered efficient beyond the purview of the individual, so that the system of science should become a racial possession and benefit, it was necessary that there should arise in the individual an instinctive desire for knowledge beyond the scope of apparent utility; theoretic interest had to develop.

Doubtless if we could foresee the whole evolution of our species we should discover that this theoretic interest does as a matter of fact lead to purely practical results, that there is no such thing as useless science, that with race experience as the test the development of knowledge is conditioned by limited and exacting needs. But it is not nature's way to dissipate energies in her chosen tools: impulse sufficient to the deed is all that she vouchsafes; and so we do as a matter of fact find sprung up in the human mind an acute zeal for knowledge apart from any recognized utility, and correlative with this, in the sense of dignity and possession which knowledge gives, an inner sanction satisfying our emotional natures. The man of science may permit the popular journals to exploit the practical benefits of his work (for from showy benefits comes the

popular willingness to support his researches), but inwardly he feels a kind of impatience with such appeal; the utility of his work is felt to be a degradation of the finer sanction, viz., his sense of dignity as an unbiased seeker after truth: in his hierarchy the "pure" sciences are immeasurably exalted above the "applied," and he feels a certain pain when his theoretic investigations result in some practical good. "And the beauty of it, gentlemen, the beauty of it is that it is of no possible use to any one!" was the customary exclamation of a certain mathematician in one of our colleges, when, covered with chalk and beaming with gratification, he emerged from a successful demonstration.

Such is perhaps the ideal specialization of the scientific disposition. But it is contrary to nature (and to definition) that any human being should be an unalloyed scientist: there is always some spark —one might almost say, some saving grace—of human interest in his make-up; a degree of pity is compelled even for Mr. Wells's humorously grotesque Cavor in his last horror at finding his mind giving way at the bare spectacle of the insanely sane Selenites,—and the author does in good sooth show us the *reductio ad impossibile* of the scientific mood in his monstrous lunar ants. A development of this kind is revolting to our every sensibility; and just because it is the inevitable logic of our scientific ideal, it enforces upon us a consciousness of the necessary limitations of that ideal, and its need for supplementation.

As a rule the supplementation comes in the form of some ulterior interest, standing above the concreteness of scientific problems and dominating the whole mental life and attitude. Except in the most intellectual periods of history this interest has been religious—a reliance upon some superhuman humanity capable of justifying every devotion to truth. Such is, above all, the attitude of scholasticism, though it is also a general heritage of our mental history. Science and philosophy, where not consciously practical, are made ancillary to faith; the justification of the ways of God to man is the justification of reason; and a kind of cosmic morality is made the sufficient ground of being. But in certain periods, the great age of Athenian philosophy, the Renaissance, and especially the Nineteenth Century, religion itself has been subjected to the demand for justification; and the conception of Truth has been exalted above that of God or of the Good.

That truth, as a supreme and universal ideal, is capable of inspiring men to a veritable fervor of devotion, is the lesson of many

a biography. There is in its appeal something more than mere intellectual curiosity; there is a sacrificial zeal as well, and often a martyr-like resignation of the dearest of human hopes. A certain abnegation and abasement is characteristic of the modern scientific attitude; it owns a kind of shame for human yearnings and the errancy of a desire-driven soul; it humbles itself before the sense of its own attainment, and seems to derive a melancholy reverence from its contemplation of the majestic indifference of nature; with heroic fortitude it strives to quench every rising flicker of merely human animation, and with stoic pride struggles to convert the mind into an impassive recorder of outward being. Its faith is the most unselfish in the world—or, if it have any match, the cry of Job, "Though He slay me, yet will I trust Him," is its sole parallel.

But the unique and wonderful feature of this devotion is not so much its abnegation of human passion as the tremendous abstractness of its object. What ordinarily moves men's love or reverence is the concrete appeal of material beauty or moral grandeur. Truth, as an ideal, by its nature, of course, possesses neither of these; and although, in most systems of thought, beauty and goodness are made truth's predicates, this is but concession to the humanness of the systems' framers; indeed, it may almost be said that the difficulties of philosophy are but the inherent contradictoriness of this trinitarian dogma of the unity of the true, the good and the beautiful. By itself truth lacks moral and esthetic appeal; and, summing in itself all real and possible knowledge, it lacks, too, any concrete interest. It is, to be sure, derived from a vast number of concrete interests, and undoubtedly the fact that it holds these interests in implicit reference is what gives it its stable hold on men. But these implied interests do not in the least explain the emotional hold of the general conception: their nature, taken severally, is as practical or theoretical problems, deriving whatever penumbrae of emotion they may possess from appetitive need or the instinct of curiosity; and there is no incentive to martyrdom in all this. Even if the nature of the universe be the implied content of truth—as for the enlightened mind it is— there is yet no explanation of the emotional hold of the abstract idea. Men undoubtedly are stirred in imagination by their inner spectacle of the evolving world, but this is obviously an esthetic stimulation; and in any case it cannot account for the sharp summoning of the great idea of which it is but an incidental exposition. For the real cause of devotion to truth and its real

*rationale* in human nature, we must inquire beyond any mere play of feeling and imagery.

II.

The degree of abstractness wherein the conception of truth is still capable of inspiring devotion, and at the same time the clue to the reason for this devotion, are indicated in the celebrated passage of the Phædrus, where, in the one phrase, Plato describes truth as "colorless, formless, intangible," and yet as "the steersman of the soul." Truth is the "steersman of the soul"; truth is a guide, a director, a ruler of life; truth is the giver of human freedom and a creator of human destinies; truth is at once the expression of man's achievement, and the agent of his efficiency.

It is the tremendous rôle which the thinking of truths has played in the creation of man's humanity, the liberation of psychical life from its lock-step dependence upon the whip and spur of ever-varying sensation, it is this deed which has inwrought in man's mind his instinctive veneration for the ideal of knowledge. Truth is the steersman of the soul, and in a very near sense; for the body of our knowledge is the chart whereby we direct the course of life, and so determine the soul's development.

The emergence of a human from the multitude of brute species is the most wonderful fact of biological history; and the wonder of it lies almost solely in the appearance of that power of thought, the power of forming generalizations, general conceptions, which is distinctive of man. Man's humanness rests its case on the fact of his human mind. What is above all peculiar to that mind is its foresight; its faculty of abstracting the fixed and constant elements from the general evanescence of experience, and, by service of such abstractions, its power to predict the future. Prediction, foresight, enables preparation, preparation makes possible the realization of ideals.

To be sure in the lower animals, nature to a degree makes good the lack of rational foresight. Instinct is her agency, and in general we may say that, in the long development of mind, consciousness acquires stability and efficiency in two modes or forms, instinct and conception. Both of these come as generalizations of race experience, enforced and ingrained by the harsh contacts of unyielding environments, and both are means of surmounting the transiency of the moment-to-moment life. Instinct is the more primitive and essential. It is also the more narrow, condensed and specialized.

Bound close to the preservative and perpetuative activities, and so restricted by the peculiar forms and needs of the organism, it lacks adaptability and elasticity. Nevertheless, it represents a vast advance over the fickleness of consciousness confined to fleeting sensation and whim. An instinct is a kind of universal; it is a sign of a recurrent experience, its relative simplicity representing the multitude of details which the repetitions embrace. It is a race generalization, fixed only after myriad efforts and at a cost of myriad failures, and already it reveals glimmerings of prevision: the honey-maker stakes present toil for future joyance, the sentinel of the herd exchanges present gratification for future safety.

Instinct, then, evinces two of the characteristics of conception, universality and prevision. But it lacks the characteristic which must be added to make reason possible, mobility, the power to form varied and new combinations to suit varied and new situations. It lacks, in short, the power to represent the novel and to create the ideal. It is anchored so snugly to the concrete case that abstraction is impossible, and without abstraction there can be no freedom, no ideality.

Thus, the hugeness of the gap separating man as the reasoning animal from the rest of brute creation is warranted by the nature of reason itself; for between instinct and reason is all the difference between blindness and seeing, between servile subjection to ephemeral events and spiritual freedom in the realm of ideas. It is the nature of conception to represent to the mind that which is not present in sense; it is the nature of reason to combine conceptions to likenesses and uses not yet realized in experience. In this nature of reason is founded human freedom,—first realized in that mastery over nature which has enabled man to conquer the antagonisms of physical circumstance and adapt, not himself to environment, but environment to his own need and profit, so that he, alone of animals, is immutably himself in whatever zone or clime.

But of vastly more consequence than this physical mastery, is the spiritual independence which reason wins for him. The sole instrument and enablement of reason is the conception or idea. Reality is fixed in the matrix of time, forming an unalterably concrete series of haps and events no one of which may beg or borrow added period; gone, each is gone forever. But it is not so with ideas. It is their character and essence to bridge and conquer time. Their truth is the experience of yesterday and the prophecy of to-morrow. They serve, indeed, to create yesterday and to-morrow, for it is by

dint of ideas alone that the reach of life is expanded beyond the mere immediacy of appetitive existence. Abstracting from the passing flow of events what is typically and reiterantly significant, they lock these significances together in the form of universals, which are the counters of intellectual life and the foundation of all intelligent experience. Valid yesterday, to-day, and to-morrow, universal ideas form the truth,—the talisman opening the portals of all knowledge and giving consistency and worth to all enduring personality. Nor has the human mind been dull to their meaning, but from the very first it has beheld in them its divinities.

III.

The human mind has evolved. It has not sprung in fullness of strength and glory from the being of creative nature. Only through long generations, the long years of man's history and the vastly longer ages of his prehistory, has it gradually and painfully come to its own. The motive of this evolution is significant of the final meaning of intelligence. As we survey the mind's growth, we see that the process has been one of slow breaking away from the thralldom of sense.

To think—to form abstractions, to classify facts, to organize knowledge—is no light or easy achievement. The animal mind, even at its highest, in the apes, we believe to be absolutely dependent upon the sensations and perceptions of the moment. There may be animals capable of a very dim foresight, but at the best their reach of thought cannot extend beyond a few hours' duration, and the content of their thought can never transcend the particular. It is the perception or feeling of the moment, in all its concrete vividness, that absorbs consciousness; the present hunger or the present grateful satiety, the present bodily zest or the present drowsiness, these are meter and guide of the conscious life.

Now the primitive human mind—at its lowest—is advanced far beyond this stage. There are no men incapable of thinking the lapse of days and nights with the concurrent duration of things—no men, perhaps incapable of thinking time in those greater measures set by the phases of the moon or the annual recurrence of the seasons. And these standards, be it noted, are objective; they are no mere appetitive change, but observed alternations in nature. Further, they are observed as recurrences—the terms day, night, moon, winter, mean not merely the experience of light and hunger of this day, the gloom and drowsiness of this night, the waning of this moon, the dolor of

this season of snow, but they mean the constantly repeated like experiences in a man's life, days and winters past and to be. In other words, they are terms expressive of generalizations; they are terms by means of which man universalizes his knowledge; they are mental signs of truths of experience.

The progress of the human mind in its slow emancipation from the domination of sense is conspicuously shown in the emergence, in the history of thought, of the great principles of reason. At the very basis of nature's intelligibility lies the principle known to logic as the principle of identity. On this is based all our classificatory science, all our generalizations, all our abstract thinking, in fact all of that system which we interject into reality by means of language; for every word, every name, denotes some special aspect of nature, which is subject to repetition. It is because two things or events are alike that we are able to designate them by the one word. Similarities, likenesses, are the keys to our intellectual mastery of what Kant calls the "blind play," the "rhapsody," of undifferentiated sensation.

Now similarity or likeness is purely an ideal relation. It pertains to an apprehending mind, not to the bare fact of reality. Similarity implies an act of comparison, a measurement of one thing against another; an act which can be function of mind only. There are no likenesses in nature; likeness is not a quality of a thing or things, but a relation, established by mind, between things. And recognition of likenesses, identities, is the first great step to the conceptual mastery of nature. It is the beginning of the formation of that map, that mental diagram or scheme of things, which constitutes our notion of the world, and so constitutes our ideal of truth.

What it cost the human mind to attain this power of generalization through observation of similarities, is impressively shown by the long and painful mental effort through which freedom in the world of ideas has been won. Through many, many generations, through many, many centuries, man thought, as most men still think, only in concrete images. Myth, fable, allegory, were the normal and necessary vehicles of abstract ideas. A new abstraction formed, wrought as on an anvil in the white heat of experience, glowed with the hue and flare of embodied life, and so was heralded to the mind as a new deity in its great pantheon of ideas. The count of every primitive religion reveals its quota of hypostatized ideas: the Hindu *Dharma,* the divine Law, comparable to the *Logos* of Greek and Christian thought; the Greek *Charis, Themis, Nemesis;*

the Roman *Justitia, Fides, Bellona*; the Norse *Frith* and *Blith*. Most of these originated as attributes of some more primitive deity—a nature deity, as these are deities of society—the attribute being first personified as a special incarnation of this deity, and then, thanks to the mental clutch which personification gives, thrown off as independent members of the divine council. Thus *Zeus* is father of *Dike*, Justice; *Athena Nikephoros*, the bearer of victory, is transformed into *Nike*, the Winged Victory herself.

But the nature gods themselves illustrate the same development. They merely belong to an earlier stratum of abstractive thought. Zeus is the shining heavens, summarizing the light and orderliness of the world above; Demeter is the earth beneath, and Kore, her daughter, is the symbol of the vegetation of recurring years. These gods are abstractions of man's experience of elemental nature, forged as it were, by nature herself in his growing mind, to enable him to overleap the narrow boundaries of the moment and master days and seasons to come.

It is many generations beyond the mythic stage of thought—a stage we have not yet wholly outgrown—that the thinkers of our race begin to realize the true meaning of abstract thinking: how it is the functional rather than the material element that is significant for human life; that truth is measured by the mastery of natural destiny which truth yields.

The primitive organization of nature under mythic forms gives place to the conception of a universe governed by law and order. But what is this law and order? In reality, it is only a new mythology, a new truth. It serves our purpose better than the old; its basis is a greater range and duration of human experience. But its basis is nevertheless nought but human experience, and human experience taken in its unreal, in its ideal, intention. Scientific law is scientific truth. This is not to say that it is fact. It is a certain statement of fact,—fact generalized. It has correspondence with fact. But the correspondence is relative to signification, to the respect in which the facts are considered, hence to human intelligence and purpose.

Let us briefly consider this relationship of truth and fact.

We cannot ask of a fact if it be true, when we mean by "fact" the actual flow of phenomena in world history; a fact cannot be other than status or locus in the general course of events; fact is reality itself; and it would be meaningless to speak of reality as true or false. But ideas symbolize facts, and according as that symbolism is efficient or inefficient, we term them true or false. To be sure,

ideas may exist as psychical events without being either true or false; they may be neutral so long as they are not predicated of anything; but this is considering them apart from a thinking process, and it is doubtful if any idea is ever entertained apart from some possible judgment. And the faintest suggestion of use in judgment is a degree of truth-error already entered into the idea. An idea which is a possibility is tinged with truth; it points to some reality of which it is the truth and it begins to shape itself to the system or context in which that reality is conceived.

Manifestly, the only employment of ideas is as truth or falsehood; they are suggested predicates or they are mental lumber. But this is not saying that there is but one species of truth or falsehood open to them. As a matter of fact, there are myriad such; as many as we have worlds abuilding,—and the ordinary mind has a considerable number of these worlds, each formed of a group of concepts united by some center of interest, to some particular purpose,—and each, at least ostensibly, unrelated to its mates. Thus, we have the world of reality in numerous fairly disjunct aspects: as a world of every-day contacts, the limited one-man reality; as a world of social ideals, the communal world; as a world of beauty and ugliness; as a world of philosophical or scientific speculation, a cosmos; and we have besides as many fictive or romantic worlds as there are fictions or romances. The same ideas are judged true or false in these various worlds only in analogous senses; and as each world has its own governing conception, ideas enter in or are rejected in utterly different proportion. In each case the candidate for truth-positing is tested for its ability to fit into and bind together the general system of which it is to form a part, and while it necessarily modifies the conceptual whole to some extent, it is itself reacted upon by the sheers and strains of the total structure.

The scientific world of law and order no less than the mythic world of the wills of the gods is thus a creation of a point of view; it is a regard in which things are considered. As a system it stands out against nature, as a sort of key to nature; and it is by no means, as we are too wont to think, embodied in the being of reality. There is a great fission between thought and things, the one having its order in a hierarchy of ideal relationships, the other in the historic flow of events known to us only in sense-perception.

IV.

Perhaps I can bring home this ideal and relative character of scientific truth by illustration.

An interesting instance of that broadening of human powers of conception which I have been stating, centers about the notion of ether. The idea of ether doubtless originates with the mythic conception of the blue sky as the abode or embodiment of divinity,—"Zeus is Aether," says Æschylus. And thence it passed into science through Aristotle's notion of it as the substance of the higher empyrean, the realm of stars.

But its significance for modern physics dates mainly from the objection of Leibnitz to Newton's theory of gravitation, that action at a distance is impossible and inconceivable. To meet the objection, ether, or an etheric fluid, was postulated as a medium for action by contact, that is, as a medium for the conveyance of gravitational forces. To-day the reverse of Leibnitz's view is the more tenable. Lotze has shown that action by contact is, if anything, less conceivable than action at a distance, and indeed action at a distance is essential to the conception of force itself, and of gravitation. For gravitation is nothing more than the expression of a relation between two bodies separated in space. Simply stated, it is the rule that the acceleration of each of the bodies is proportional to the mass of the other, while the attractive force or tendency is inversely as the square of the distance. The word "force," as applied to gravitation, means only a tendency to motion of a certain sort under certain conditions; and it is affirmed that this is universal. But under certain ideal conditions it could not be universal. For the force of gravitation is purely an attractive force, that is it is a tendency of motion of bodies toward one another. Now if it be conceived that this force is the only one in existence and further that it is operative only in the particles (mere centers of this force) composing the earth, then there would be one irresistible and ever accelerating tendency of all these particles toward the earth's center of gravity, involving the ultimate shrinking of the globe to a mere punctual nothingness. The same mishap would occur, under like supposition, to a finite universe.

Of course such a *reductio ad absurdum* of gravitation is too far from the facts of reality to be more than idle speculation; there are repulsions as well as attractions to be taken into account; but at least it serves to emphasize the fact that human theories are built upon too narrow a range of phenomena, hold true of too limited a sphere of reality, to serve as a foundation for the prediction of cosmic destinies. Even in our own solar system it is not certain that gravitational attraction does not exceed the ratio expressed by the law, though by an infinitesimal fraction, as the sun is neared.

In emphasizing the limitation of scientific theory, scientific achievement is in no wise being brought into question. What is essential to be understood is that scientific thought is to-day in rapid evolution and that scientific knowledge is at best only an account of restricted fields of reality. A generation ago Mill held that the whole inquiry of natural science is for causes of phenomena; to-day physicists assert that the notion of cause has no place in their science at least. Time, space, mass are the categories under which physical phenomena may be conceived. Is it for a moment to be supposed that these can give an adequate account of this rich and varied world in which we dwell? The whole region of growth, vitality, consciousness, the visible, tangible, audible dimensions of creation, are yet to be taken into account.

For a quarter of a century philosophers have been examining and analyzing scientific conceptions with an assiduousness and interest proportional to the immense significance of their metaphysical bearings. The result of this investigation has been singularly unanimous. The body of scientific law is conceded to be a powerful instrument of knowledge, a veritable calculus of reality, but in no sense a photographic reproduction of reality; it is a mnemonic device for the assemblage of facts useful or calculable; it is not a narrative of creation. In consequence of this view, materialism,—the conception of the universe as an atomistic machine,—has been utterly discarded. It answers not the least demands of reason, accounts not for the most potent facts. In its place, idealism, in some form or other, holds general sway; and it is safe to assert that the doctrine of evolution with its attendant theories, has served no end more certainly than that of compelling the philosophic conclusion that purposive intelligence is the chief fact, the *Leitmotiv* of the universe.

Of course the philosopher, too, frames his opinion upon the meager basis of human experience. There is a temerity periling effrontery in any effort to infer the whence and whither of the cosmos from a span of experience at its utmost covering less than ten thousand recorded years, and in its free intelligence only a fraction of that time. But the philosopher at least has in his favor that he judges in accordance with instincts to which nature has indubitably given rise; he recognizes and considers those human values which for us are alone significant.

V.

Protagoras began his treatise on truth, "Man is the measure of all things." The history of the growth of knowledge since his day

only emphasizes the certainty of this aphorism. Our measure of the world is human science, and the measure of science is human intelligence,—in last resort the power of imagination. For imagination is not alone the solace of life; it is also, and above all else, the faculty which has lifted man above the time-serving brute, making possible his insight into the natural history of what lies behind the screen of sensation. Imagination is the power whereby we discover truth; it is the instrument by means of which we rear the wonderful structure of human knowledge, our parable of reality. Its potency measures possible science; its flexibility determines mental evolution. According to Herbert Spencer, conceivability, or as he puts it, the inconceivableness of the negative, is our final criterion of truth. Upon the mind's power to abstract and relate phenomena science is dependent, and with this power science is limited. John Stuart Mill, in comment, pointed out that human power of conception is not a static thing, that it expands from generation to generation,—the antipodes, inconceivable in the fifteenth century, are accepted as commonplace in the sixteenth,—and by reason of this expansion, continually broadens the mind's horizon, continually throws back the borderline of possibility. On the one hand is human impotence, the mind's abashment in the presence of the unknown, but on the other there is an energy of growth ever straining the leash of mortal circumstance.

"Man is the measure of all things." But man's is a changing, a growing nature. Ever he seeks to project this nature out into the cosmos which environs him, and ever he finds the cosmos growing with his own inner growth. The system of the sciences is continually enlarging and must continue to enlarge so long as there is growth of intelligence. The system of the sciences is our truth. And this is, of course, to say that truth is ever changing, ever growing. Truth is relative to human insight. It is nothing fixed in the being of the world of fact; it is only that ideal of this world which mind has found useful to mind's purpose.

And from this point of view we are warranted in criticising the conception of nature which commonly goes under the name of materialism or of mechanism,—the view, often called the scientific view of things, which asserts that our earth and our solar system are but a phase in the evolution of some primordial cloud of star dust, due in the tale of the ages to become star dust once again. From nebulae worlds are generated to be resolved once more to nebulae after running their course. Man's life is but an incident of this cosmic

process, it is meaninglessly generated to be as meaninglessly snuffed out; and the sole rôle of human intelligence is to evolve a knowledge of the uselessness and hopelessness of human life, while the acme of human dignity lies in the attainment of a sort of melancholy satisfaction in reviewing the grim spectacle of the cosmic æons.

It has ever been the cue of those who see in the cosmos a colossal machine grinding slow fatalities, to bid man to realization of his own weak, paltry, and precarious being; he is summoned to consider himself the helpless factotum of vain and foolish destinies in whose whim he must humbly acquiesce. This is but a new species of anthropomorphism,—man worshiping the shadow of his blinder self; for the conception thus raised up as the august antipode of human frailty is still a creation of the human mind, a part of the proper furniture of that conscious being which is summoned to abashment.

The conception of the life of the universe as consisting of cycles of blind evolutions followed by blind destructions is not a new conception. It is older than the despair of Buddha, and if in no just sense ascribable to Heraclitus, it is not to be distinguished from the conception which lay at the basis of the ascetic abnegation of the Stoics or that which issued in Proclus's ghastly theory of world degeneration. It *may* be that the conception is true. But the "may be," let it be understood, is merely an acknowledgment of human fallibility. It means only that our finite knowledge is incapable of conclusively gainsaying any possibility; it does not mean that the theory itself is, humanly speaking, probable or plausible.

For we must remember our premises. Truth is not the gist of reality, but our scheme of it, measured by our intelligence; and our nature and intelligence is ever-growing. If we know anything in this world it is the fact of growth—the fact of ever-receding limits to knowledge — the fact of never-ending imaginative conquests. Growth of mind is growth of imagination; growth of imagination is continuation of our mental conquest and absorption of nature. There is no ultimate or absolute truth so long as life is, nor is any final pronouncement of man's destiny possible so long as man is engaged in making his place in the world.

It is not unnatural, then, if we feel a certain grotesqueness in the contention of those whose business it is to be seers of truth, that, with the bourne of their imaginations reached, the fullness of human knowledge is in sight. To be sure, we concede a limit at which each individual imagination must balk further progress; but

that limit attained, it is not the part of an oft-vaunted scientific humility to challenge future insight. It is as were the imagination to come saying: "I am old. I am weak and worn. I can see no more. But I have conceived and brought forth my thought, the satiate truth. Beyond there is nothing."

It is little wonder that such a view should have led, through the contrariety of despair, to Nietzsche's barbaric laudation of man as the "great blond beast" overriding natural destinies. But it is wonder that it could ever so appeal to human rationality as to blind men to the evidences of intelligence in the world. Our own reason is an instance of this intelligence, and we are at least parcel of nature. Nor is there any contradiction of science in making,—nor any warrant of science which opposes,—the assertion of higher intelligence than ours in the universe, battling, with us, against night and chaos.

Furthermore, even in the mechanistic view of nature, there is an invariable, if often unwitting, insistence upon the human factor—the man-value of truth. In itself mechanism is the most monstrous of idolatries. It outrages every sentiment of the soul, every principle of the reason (though this is not saying that it may yet not be fact; if the world be chaos, reason is chaotic with the rest). In order to redeem it, the mechanist seeks to furbish it up with some aspect of human significance. The best of his conception is a sort of Overman,—one who has extinguished all the warmth of human feeling and desire, and in place of a destiny answering man's natural needs has set the chill ideal of impassive Intellect. But this, too, is human. *Man* after all is the measure; he alone is the unit of worth—he, the weak sport and victim of the colossal nightmare! If there are meanings, they are meanings for the human soul; if there are truths, they are truths of human destiny; if any value is, it is the creation of human experience. The intellectual value that is recognized is a product of dissection and mutilation—self-dissection, self-mutilation—but it is none the less part and parcel of man's being. The naive openness of the confession shows the faith of the mechanist the more appalling. One sees him precarious on the verge of realization; one trembles for the revelation that may shatter his trust. Helpless in the coils of his belief, already he begins to feel dimly the horror of it, the horror he has never dared to front, face to face. With the desperate old instincts of his soul he clutches still the humanhood for which his creed has no place, attesting still the

supreme worth of that spirit his philosophy must deny. Man, though mere mortality, about to die, he salutes.

VI.

Perhaps the wisest of the ancient sayings concerning truth is Plutarch's, "Truth is a striving after divinity." In what has preceded I have endeavored to show that truth belongs to the world of ideas and ideal relations—of human ideas, human thought.

But there is another world of Ideas—Plato's world of divine Ideas, the model and archetype of the visible universe. Human ideas, according to Plato, and human works, and indeed all the works of visible nature, are but imitations of these divine archetypes. They are but expressions of that dumb striving of all imperfect being after perfect being which Plato found to be motive alike of the history of mankind and the history of changing nature.

Nowadays we give Plato's thought a new interpretation. In the light of the doctrine of evolution we are once again brought face to face with a scheme of nature the motive of which is the striving of an imperfect after a perfect being. Through the long ages of geologic time we see species and genera and orders of life, at first embryonic in form, affording only a faint premonition of their eventual type, proceeding by devious and laborious paths to this type's realization. A striking example of this is shown in the development of that one of the orders of the mollusk class—the Cephalopoda, now only represented by the "many-chambered nautilus." Beginning far back in paleozoic times with genera of the type of the Orthoceras, preserved to us in the form of simple conical shells compartmentally divided, this branch developed through the ages; first, slightly curved forms; and then the more and more tightly coiled varieties with ever-increasing complexity of structure, which culminates in the Ammonites—coil contiguous upon coil. It was as if, through all those millions of years, nature had held before herself this ideal of beauty, to be consummated only through infinite experiment, infinite endeavor, infinite striving. Thus the wonder of the Ammonite is a part of the meaning of the Orthoceras, though the realization of this meaning was to be bought at a price of æons. So it is with every natural type. It is contained implicitly in its dim precursors, but only the long years can bring nature's thought to the surface.

Does not this mean intelligence, reason, plan in the universe? A truth like our truth in being ideal, in existing for the future toward

which like ours, it is ever reaching out? It means this, or our own truth is illusion.

And the human mind,—the human mind is itself a product of this striving growth. It is itself a part of the divine plan contained in that world of ideas, which forecasts evolutions. We as human animals are creatures of this creative nature.

Only—and here is the great fact—the end of our development is not its material form. Nature has not exhausted her gift to man in the creation of his body,—his physical vital history. She has given him mind. And it is the great function of mind to win for us freedom from the flux and flow of merely physical destinies. In attaining the ideal the mind becomes emancipated from the perishable world of things; it wins its freedom, as Spinoza puts it, in the world of ideas. Truth, then—our human truth, relative, mutable, ever imperfect, ever-growing,—is the means and symbol of the deliverance of the soul from merely mortal destinies. It is not for what truth pictures to us—the world idea it generates from generation to generation—that it has meaning, but for what truth does for us, that freeing of the spirit which can come only with ideals that lift us above the chance and circumstance of material time. "Truth is a striving after divinity"—that divinity which from the first man has found only in the world of his ideals.

HARTLEY B. ALEXANDER.

UNIVERSITY OF NEBRASKA.

## PRAGMATIC REALISM.

There has been a great deal of confusion in regard to terms in recent discussion. It may be well, therefore, to define, at the outset, what we mean by realism. A number of writers have called themselves realists and proposed to champion realism, when they are really indistinguishable from idealists. Here, at least, the Leibnitzian law of indiscernibles ought to hold. If the terms realism and idealism are retained at all, they ought to stand for different concepts. It is hard to see how theories which strive to express reality in terms of a series of perspicuous or translucent states of consciousness can be called realism. This would surely make the shade of Berkeley wince. Leaving out all reference to the metaphysical stuff for the time being, realism means the reference to an object existing beyond the apperceptive unity of momentary individual consciousness, and that this object can make a difference to

that consciousness so as to be known. The object, in other words, is dependent upon the cognitive moment not for its existence, but for its significance. Idealism, on the other hand, would hold that there is strictly only one unity of consciousness and that existence is a function of being part of a significant system. Thought is so wedded to things that things cannot exist without being thought. This assumption on the part of idealism may be veiled under various terms, such as appearance and reality, the finite and the infinite, the incomplete purpose and the completely fulfilled purpose; but in the various forms of expression the assumption remains that all the facts are ultimately and really strung on one unity of thought.

To avoid uncanny metaphysical associations it may be well to point out that realism is an epistemological attitude and has to do with the relation of the cognitive meaning to its object. As regards stuff it may be materialistic, spiritualistic or dualistic, though to-day it is more likely to be spiritualistic. As regards connection it may hold the mechanical interpretation as regards the relation of parts; or it may hold the teleological point of view; or partly one, partly the other, which is the position common sense realism takes. As regards the numerical distinctness of the universe, it may be monistic, holding the universe to be one individual with only apparent diversity in space and time; or it may be frankly pluralistic, holding to the numerical diversity and distinctness of individuals. As realism, therefore, is pledged to no brand of metaphysics, no odium need attach to it so far as metaphysics is concerned.

Realism, as I understand it, does not assume that there can exist isolated or independent individuals of such a kind as to make no difference to other individuals. No individual has any properties, chemical any more than psychological, by itself. Qualities are reactions or expectancies within determinate contexts. An isolated individual cannot even be zero, as zero must be part of a logical context at least. The hypothesis of independent reals is founded either on contradictory or on purely hypothetical conditions. Kant's things by themselves are instances of the latter kind. These cannot exist for experience or in relation to things as known. Yet they are supposed to be possible for an intuition entirely different from ours. Leibnitz has recourse in the last analysis to an emanation theory and preestablished harmony, which contradict his assumed independence. Cognitively independent his monads could not be in any case, since by implication they are aware of each other.

Realism does not deny that objects to be known must make a

difference to reflective experience; that they must be capable of being taken in a cognitive context. To deny this, within the universe of truth, would be self-contradictory. What realism insists is that objects can also exist and must exist in a context of their own, whether past or present—independent of the cognitive subject; that they can make differences within non-cognitive contexts, independent of the cognitive experience, which the latter *a posteriori* must take account of. Thus the wood in the grate burns, even though we are not taking account of it; the seed grows when we are asleep, through properties involved in its chemical context. Even our own meanings grow without our being reflectively aware of their change.

As our own cognitive meanings are necessarily finite and any other type of knowing is necessarily hypothetical, it is difficult to see how any theory of knowledge can avoid being realistic. Absolute idealism, with its hypothetical unity; and mysticism, with its ineffable noëtic intoxication, still must admit that the finite meaning, in striving for its completion, implies an object beyond its internal intent. To deny this is to fall into solipsism or to confuse oneself with the absolute. The complete absolute meaning cannot be said to depend for its existence upon our finite fragmentary insight. And it is with that finite intent that our problem of knowledge is concerned.

In order to clear the way for realism, we must get rid of some fundamental fallacies which permeate most of our past philosophic thought. One of these fallacies may be stated as the assumption that only like can make a difference to like, or that cause and effect must be identical. This has been assumed as an axiom by idealism and materialism alike. For idealism and materialism are alike indiscriminative. Their method is dogmatic rather than critical. The only difference is in the stuff with which they start. Idealism, starting with meaning stuff, tries to express the whole universe in terms of this. Materialism, starting with mechanical stuff—stuff indifferent to meaning and value—must be consistent, or as consistent as it can, in expressing the universe in terms of this. Both buy simplicity at the expense of facts.

The problem is the old one of Empedocles: Can only like make a difference to like? "For it is with earth that we see Earth, and water with Water, by air we see bright Air, by fire destroying Fire. By love do we see Love, and Hate by grievous hate." Expressed in terms of modern idealism, from the side of individual consciousness, the problem would read: Can only experience make a differ-

ence to experience; can only thought make a difference to thought? The absolute idealist attempts this disjunction: The reality which we strive to know must either be part of one context with our own finite meaning, must be included within the completed purpose, the absolute experience, of which we are even now conscious, as well as of our finitude and fragmentariness; or, on the other hand, the real object must be independent of our thought reference, must exist wholly outside our cognitive context, without being capable of making any difference to it. But complete independence is meaningless; therefore there must be one inclusive experience. To think an object is to think it as experienced, therefore it must be experience.

The issue at this point between the realist and the idealist is a twofold one. The realist insists that there can be different universes of experience which can make a difference to each other; and also that what is non-reflective or non-meaning can make a difference to our reflective purposes, or *vice versa*. We can reflect upon a stone; that makes the stone experience *for us*. But does it also make the stone *as such* experience? It is as reasonable, at any rate, to say that only water can know water, and that therefore in order to know water we must have water in the eye or in the brain, as it is to say that in order to know the stone or to reflect upon the stone, the stone must be reflective. In either case our attitude is merely dogmatic. That objects in order to be known must be capable of being taken again in the context of cognitive experience is, of course, a truism. But that does not prove that they cannot exist without being known or that they must be experience in order to be known.

Science has been forced to abandon the axiom that only like can act upon like. It is busy remaking its mechanical models in order to meet the complexity of its world. Chemical energy need not be the same as electrical or nervous energy to make a difference to either. Chemical energy implies weight and mass, while electrical or nervous energy does not. The old metaphysical difficulty in regard to conscious and physical energy has given way to a question of fact. The question is not, *Can* they make a difference to each other? but, Is there evidence of their making any difference to each other? A cup of coffee or a good beefsteak makes a difference to thinking. But that does not necessarily make them thought stuff. Whether cause and effect are identical, either in kind or in time, is something for empirical investigation to determine, and not to be settled *a priori*. Science presents strong evidence that they need be neither. The light rays may have traveled through space many

years before they make the difference of light sensations in connection with our psychophysical organism.

It is time that philosophy, too, were abandoning dogmatism in favor of facts. It is no longer a question of materialism or idealism; but we must use idealistic tools where we are dealing with idealistic stuff and mechanical categories where the evidence for consciousness and value is lacking. We must learn to respect ends where there are ends; and to use as means those facts which have no meaning of their own. To fail thus to discriminate is to be a sentimentalist, on the one hand, or a bore, on the other. What we want is a grain of sanity, even the size of a mustard seed.

The merit of idealism, and for this we ought to give it due credit, is that it has shown that the universe must be differentiated with reference to our purposive attitudes. This is true whether the reality to be known is purposive or not. Where idealism has been strong is in interpreting institutional life. In order adequately to know another meaning, we must copy or share that meaning. This is true whenever our reality is thought stuff. Idealism, on the other hand, has always been weak in dealing with nature, and, therefore, in furnishing the proper setting for natural science. Idealism has striven to institutionalize nature or to reduce nature to reflective experience. In order to do this, it has been forced either to insist upon the phenomenality of nature, with Berkeley and Green, or to take the ground of Hegel, John Caird, and Royce, that nature is essentially thought, social experience, the objectification of logical categories, though *an sich* and not *für sich*, i. e., as lived over by reflective experience. Hence nature becomes capable of system; it is essentially systematic. In thus apotheosizing the unity of apperception into an objective unity of nature, idealism has failed to discriminate. The stone and Hamlet are lumped together. But we cannot acknowledge or react on nature as reflective or as experience on its own account, and therefore idealism breaks down. We make the *conceptual system* of nature, as social minds, to anticipate the future and to satisfy our needs. The meaning of the energy that satisfies and of the transformations by which it satisfies is furnished by our subjective context. Water satisfies thirst. That is an extra-subjective energetic relation. But the why must be furnished by our imperfect context of scientific experience. Our knowledge of nature, we must confess, is partial and selective. Not completeness, but control, is what we must aim at. Knowledge is good here when it works. It does not exhaust the manifoldness of nature.

Materialism has been quite right in applying the mechanical categories to part of reality. The mechanical ideals will always find favor in natural science, where the aim is not the understanding of an objective meaning, but control of nature for our purposes. Where the materialist shows his dogmatism is in applying categories which are convenient in dealing with the non-purposive structure of the world to institutional reality as well. In failing to make them work here, instead of calling into play new categories, he insists upon eliminating the refractory world of meaning and value, while the idealist, with his eye primarily on the world of social tissue or ideals, has insisted that the real is essentially the social or communicable. Each has failed to recognize how the other half lives.

Another dogmatic fallacy which has been committed by idealists, to smooth out the realistic discontinuities and ease the shock of actualities, is the play upon the implicit and explicit. I would not say that the category of the implicit has no legitimate use. Wherever we are dealing with a purposive whole of any kind, intellectual, ethical or esthetic, we not only can but must use the category of the implicit. The earlier part of the argument must imply or foreshadow the later within the logical unity. The earlier part of the dramatic plot must find its fulfilment in the later; the moral struggle points to an ideal. The abuse of the category of the implicit comes when we apply our purposes to infra-purposive realities. Because thinking as a process arises under certain structural conditions of complexity, this does not prove that earlier and simpler stages must be treated as degrees of thinking. There seem, on the contrary, to be qualitative leaps in the genetic series of experience, not reducible to the quantitative category of degrees. Thinking is a new fact in the series—furnishes a new context of significance. Again, because we systematize nature according to the presuppositions of the reflective moment, this does not imply a reflective unity in nature. Here again there seems to be a discontinuity, so far as meaning is concerned, which thought must acknowledge and cannot bridge, objectively at any rate, by any implicit assumption as regards thought's own procedure.

Another current dogmatic fallacy is the assumption that because we take contents over in thinking them, therefore we transmute or make them over, if indeed we do not create them outright, in taking account of them. But the transmutation of the immediate or non-reflective has to do with its significance, not its content. The colors in the painting are the same that we have seen thousands

of times, though here they are used to express a new meaning. The gold we think about has precisely the same qualities as the gold which was present as an object of immediate perception or esthetic admiration. It does not change its color or size because we reflect on it. It is the same object with the same qualities and relations, i. e., if we conceive it truly, except that much of the existential has been omitted and the relation of cognitive significance has been superadded.

Another fallacy is the assumption that what is not stuff cannot be real. This assumption is very old. It is assumed by Parmenides when he dismisses non-being as unthinkable and unspeakable. It is assumed by Kant in his antimony of space and time, when he maintains that the relation to nothing is no relation. Most philosophers have followed the leadership of these distinguished thinkers. But the assumption that zero is unthinkable and that the relation to nothing is no relation has been abandoned by mathematics for logical reasons. There is no more important relation in number than the relation to zero. The limiting concept of zero has also proved of great value in metaphysics as well as in mathematics. Take space for example: While space is no *thing*, yet as distance it is an important condition in the interaction of things.

Instead of the dogmatic method pursued by the old idealism and materialism alike, we must substitute scientific method. This method has been rechristened within recent years by C. S. Peirce and William James and called pragmatism. As I understand this method it means simply to carry the scientific spirit into metaphysics. It means the willingness to acknowledge reality for what it is; what it is always meaning for us, what difference it makes to our reflective purposes. Instead of insisting upon identity of stuff, as dogmatism has always done, this method is discriminative. It enables us to break up the universe and to deal with it piecemeal, to recognize unity where there is unity and chaos where there is chaos, purpose where there is purpose and the absence of purpose where there is no evidence of purpose. The universe in each part or stage of development is what we must acknowledge it to be, not necessarily what we *do* acknowledge, but what we *must* acknowledge to live life successfully. This acknowledgment, moreover, is not a mere will to believe or volitional fiat, but, at least as knowledge becomes organized, a definite and conscious acknowledgment. An unlimited will to believe as regards objective reality would be possible, if at all, only before we have organized knowledge, that is, if you could

imagine knowledge starting in a conscious will-act. When we already have organized knowledge, if we choose to know, the possibilities become limited. In case of fully organized knowledge the place of the indeterminate will to believe would be the will not to think, that is, to commit intellectual suicide.

Neither can we state the truth attitude in merely subjective terms. The truth attitude must face outward. It must orient us to a context existing on its own account, whether past or present. In such orientation or such external meaning lies the significance of truth. The truth attitude cannot be characterized as merely doubt with a transition to a new equilibrium, and as ceasing with certainty. The truth attitude *may* at least involve the consciousness that we know that we know. To be sure, the nervousness of science leads us to repeat the experiment, in order to make sure that we have made no mistake; but that does not alter the truth of our first finding, if the experiment proves correct. Truth, as we have it, involves two things,—first, luminousness, or a peculiar satisfaction to the individual experience at the time, due to its felt consistency or fluent termination in its intended object. This is the positive truth value, whether formal or factual. The other factor involved in scientific truth is the feeling of tentativeness or openness to correction. This is a qualification or nervousness on the part of the truth attitude either as a result of an actual feeling of discrepancy and fragmentariness as regards our present meaning; or it may be due to a more general feeling of instability based upon our finitude and the time character of our meanings. Such correction can only come through further experience, whether of the immediate or formal type. We cannot say that the value *consists* in the future consequences or leadings. These obviously have no value until they come. Further experience furnishes the possibility of correction of our truth values and so of producing new values. I say *possibility* of correction because repeating the experiment, while it relieves our nervousness, does not necessarily produce a new truth. The truth meaning must first be stated in schematic terms on the basis of the data as we have them and then tried out in terms of consequences. If the truth value lay merely in the consequences or leadings there could be no such thing as truth value. Truth must face backward in order to face forward. It is Janus faced.

We may lay it down, then, that the real must be known through our purposive attitudes or conceptual construction. Real objects are never constituted by mere sense perception. They are not com-

pounds of sensations. Sensations are our awareness of the going on of certain physiological changes, whether connected with an extra-organic world or not. They cannot be said, therefore, to constitute things. These presuppose selective purpose. They can only become objects for a self-realizing will. The real is the intelligible or noumenal, not the mere immediate; and by the noumenal I mean what we must meet, what reality must be taken as in our procedure, as opposed to our sensations. It is through conative purpose that knowledge of the character of our world becomes possible. The immediate, however, must furnish the evidence; in the language of Professor James it puts us next to the real object, it establishes energetic continuity with the intended context of reality.

Empiricism, therefore, is at best a half-way house. We cannot say that the real is merely what *is* perceived or what *makes* an immediate difference to our conscious purposes, whether in the way of value or of fact. We must at least say that the real is what *can* be perceived, unless we bring in some *deus ex machina* or supernatural storehouse of percepts, as Berkeley does. Surely the empirical idealist of to-day would not say that the increased powers of the telescope or microscope create the facts. Nor can the uniformity of our expectancies be credited to our individual perception, and, hence, from the perceptualist point of view, requires another *deus ex machina.* To say that uniformity or stability is a social fact does not explain the fact, but presupposes an extra-social constitution, a constitution binding upon all of us. Not only perception, but *possible* perception, must be invoked to complete the empirical idealist's reality; and "possible" itself is not a category of perception.

As the old idealist and the old realist alike assumed the qualitative identity of cause and effect, it became necessary to think of subjective states as copies of external qualities. Naive realism and idealism alike assume this copy-relation of the subjective on one hand and the real qualities on the other. In modified realism, the primary qualities at least must be copied. For the empirical idealism of to-day the problem still remains as to whether the perceptions and the objective qualities are the same. Unless the idealist becomes a solipsist he must show that his subjective copies are adequate to a world as existent. This difficulty would vanish, once we abandoned the dogmatic and unintelligible duplication of qualities, as though qualities could exist passively by themselves. Qualities are energies. They are what objects must be taken as in determinate contexts. To ask what perceptual qualities are, when

they are not perceived, becomes in that case as superfluous as it is meaningless. Processes, of which we are not conscious, have no perceptual qualities, unless, under certain other conditions, they can make perceptual differences to beings organized as we are. To speak of archetypal qualities is merely duplicating this moment of perception —to take what exists in a context as an abstract idea. If these non-conscious reals act upon other non-conscious reals, we have not perceptual differences, but chemical or physical changes. These must be interpolated by us in order to make continuous our perceptual scheme. We saw the wood burning in the grate: in our absence the fire has gone out and the wood has turned to ashes. To piece together this discontinuity in our perceptions we must assume certain differences or changes which cannot themselves be expressed as perceptions. And thus we come to realize that while we must take some qualities of things as existing as part of our perceptual context, we must also take other qualities as existing independent of perception in their own dynamic thing-contexts, which we can read off *a posteriori* and predict under determinate conditions.

Even granting a being, therefore, who should have perceptual differences for all the changes going on, minute or great, and without breach of continuity, even he would not have a complete account of reality. The real individual cannot be exhausted as a compound of perceptual qualities. He must be acknowledged as something more than the sum total of his sense appearances, past, present and future. If sensations alone constituted reality, then the more sensations the more reality. Take Helen Keller's reality, for example, on this supposition. For convenience, I will use Professor Titchener's estimate of the number and kinds of sensations. According to him, sight furnishes us 32,820 different sensations, hearing 11,600, making a total of 44,420. As Helen Keller possesses neither the sense of sight nor that of hearing, her reality would be to our reality as 15 is to 44,435. But Helen Keller seems to be able to enter into communion with human beings all over the world, to share their purposes, to sympathize with them and help them better than most human beings with the use of all their senses. The reason the position that reality is the sum of its perceptions, has seemed so plausible lies partly in the fallacious use of the method of agreement, partly in the confusion between the *causa cognoscendi* and the *causa essendi*. The perceptual qualities do exist; and it is through them we become immediately conscious of an external world. Objects are

what they are perceived as, but indefinitely more. We must not forget that there are other contexts, such as the multitudinous thing-contexts and the contexts of our will attitudes. These may be practically more significant for determining the reality of a thing than our sensations—not all of which can be treated as sense qualities. It may be of more practical significance for the nature of water that it satisfies thirst than that it gives us a number of contact reactions. When we come to deal with a human being, a friend of ours, the inadequacy of mere perceptual qualities becomes even more evident. He is not to be taken merely as his height, nor his color, nor his softness, nor his hardness, nor even the sum total of all the perceptions we can get. He is primarily what we must acknowledge, what fulfills a unique purpose on the part of our wills, and, as opposed to the gold or the stone, a reality with an inner meaning which we can to some extent copy.

We have seen that experience becomes truth only through conceptual construction or purposive will attitudes. Percepts only become cognitively significant as termini of ideal construction, as verification stuff. No wonder that the perceptualists have not been able to discover non-being dimensions, since these could not be perceived, but discovered only through the most subtle conceptual tools, according to the real difference which they make to our purposive striving. We have already indicated that because reality can only be known conceptually, that does not mean that reality must be conceptual. Reality is, however, only knowable in so far as it is conceptualized. In recognizing that reality could not be treated altogether as purpose, moral or intellectual, Kant showed a keenness far exceeding that of his critics, as he showed his obtuseness in not recognizing that purpose, as expressed in individual and institutional life, is a real part of reality.

Since perceptual qualities are the felt continuities or functional connections of energetic centers, when a conscious agent is part of the complex, there can be no sense in speaking of these qualities as either acting upon the will or parallel to the world of will-acts. The perceptual qualities do not exist independent of the concrete situation, so that they could act upon it. They are what the object must be taken as, or known as, *in* the special psychophysical context. They preexist only potentially, i. e., as what the object can be taken as in the determinate context. They are, however, only one type of transient connections or energetic continuities. These energetic continuities may be intersubjective relations, and in that case com-

munication and conceptual understanding are possible. They may be relations to centers below the reflective level. In that case knowledge becomes instrumental—a reweaving of a non-meaning context into the unity of our purposes.

Equipped with our subjective purposes, or conceptual tools, we can confront the larger world. In the course of conscious experience, as we strive to realize our tendencies, formal or parctical, the world beyond us becomes differentiated and labeled according to our success or failure. But the real objects are not constituted by our differentiation, except when we make our realities outright, as in the case of artistic creation. The meaning for us is, indeed, created in the course of experience, but not the objects which we mean. Else science were impossible. The real objects must be acknowledged or met, whether they are to be understood or to be controlled.

The world of real objects may be differentiated into two general divisions, the world of being or stuff, on the one hand, and the world of non-being or non-stuff, on the other. By the former I understand various types of expectancy or uniformity, which we can have in regard to our perceptual world. These types of uniformity, again, can be graded into two main divisions, namely, those which we can acknowledge metaphysically as purposive in their own right and those we must acknowledge as existing and must meet, but which have no inwardness or value on their own account. The former we must learn to understand and appreciate, the latter to anticipate and control. The former constitute the realm of idealism, the latter of materialism. Whether our conceptual structures should be regarded as copies or as tools with reference to the larger world is not a question that can be settled after the manner of *either or,* but must depend upon the kind of reality we mean. If this reality is that of other purposive structures or meanings, then the relation must be that of copying or sharing; if the reality aimed at is infra-reflective, then the relation must be instrumental. As regards the stuff character of reality our theory is frankly pluralistic, acknowledging different kinds and grades of energetic centers according to the differences they make to our reflective purposes.

But we must also take account of the non-stuff dimensions of reality. These differ from the stuff types in that they are not perceptually continuous with our psychophysical organism. They cannot appear as immediate phenomena, but still must be acknowledged for the realization of our purposes. Thus we must ackowledge the transformation of our values, the instability of our meanings. *Time*

creeps into our equations and makes revision necessary. New values can only be had by waiting. Again, *space,* as distance, abstracting from the content of space, conditions our intersubjective relations, as well as our relations to non-purposive beings. It makes possible externality of energetic centers and free mobility. Further, the relativity of our meanings and ideals makes necessary the assumption of an absolute *direction,* a normative limit, to measure the validity of our finite standards. Lastly, we find it convenient to abstract the fact of *consciousness* from the changing contents and the conative attitudes. While our awareness is intermittent, the conative attitudes and purposes may be comparatively constant. These non-stuff dimensions must be regarded as real as the will centers which they condition. They are more knowable than the world of stuff, because their characters are few and simple, whereas the varieties and contexts of stuff are almost infinite. Thus, by means of our conceptual tools, we are able to discover not only various kinds of stuff, but we are able to discover dimensions of reality of ultimate importance, where microscopes and telescopes cannot penetrate—realities which eye hath not seen nor ear heard, nor ever will see or hear, more subtle than ether or radium, if these be more than fictions.

JOHN E. BOODIN.

UNIVERSITY OF KANSAS.

## EDITORIAL COMMENT.

Prof. John E. Boodin will be remembered by the readers of *The Monist* for his article on "Philosophic Tolerance" (April, 1908) in which he supported the pragmatism of Professor James. At that time the editor asked him to make a reply to the comments on his views in the editorial article on "Pragmatism" which appeared in the following issue. Professor Boodin has not made use of the invitation, but prefers to offer to the readers of *The Monist* an exposition of his views without reference to the controversy in question.

In the present article Professor Boodin makes the following statement: "Instead of the dogmatic method pursued by the old idealism and materialism alike, we must substitute scientific method. This method has been rechristened within recent years by C. S. Peirce and William James and called pragmatism."

If pragmatism avowedly accepts the scientific method, would it not be better to call it the "Philosophy of Science"? Nevertheless,

so far as we understand the movement, pragmatism does not credit science with the ability to build up a philosophy. To pragmatists the will to believe and the personal equation are more important than the assured results of scientific inquiry while science is criticised for the instability of its doctrines.

We do not believe that C. S. Peirce and Prof. William James can be lumped together as if their pragmatism were one and the same. Each of them has his own preferences but both are very different. Mr. Peirce is strong in logic and truly scientific in his work, while William James is very original and ingenious. But if pragmatism, as commonly understood, were truly nothing but another name for "scientific method," it would not have anything new to offer, and there would be no need of starting life over again; it would have been sufficient to continue the work of science and apply its methods more and more thoroughly in all fields, especially in the department of philosophy.

## ON POINCARE'S "MATHEMATICAL CREATION."[1]

M. Poincaré's essay on mathematical invention which appeared in the July *Monist*, is of supreme interest for the psychologist. It offers a valuable contribution to the psychology of genius, at the same time relegating "unconscious cerebration," the importance of which has been somewhat exaggerated, to the place it ought to occupy.

Why are so few men capable of mathematical creation or even of comprehending mathematics? M. Poincaré, I believe, gives the best reason when he attributes this impotence not only to an insufficient strength of memory and attention, but even and especially to the absence of a special intuition, of a proper feeling for mathematical questions.

A mathematical demonstration in fact, as he rightly says, is not a simple juxtaposition of syllogisms, but a succession of syllogisms placed "in a certain order"—an order which the true mathematician feels directly so that he perceives as "a whole" the course of reasoning which supports it.

In my opinion a secondary difficulty upon which Poincaré has nothing to say and of which he has perhaps failed to take note, lies in the use of symbols. This difficulty (and we may note in passing that scientific symbols are usually repugnant to artists, especially

[1] Translated from the French by Lydia G. Robinson.

to painters) generally appears whenever we depart from the concrete, or rather from a presentation which is familiar to us, to pass to one which is less, or not at all, familiar. Thus certain people have trouble in relating the true geography of a country to its representation on a map. Such again in other respects is the case of the musician who does not compose without resorting to his instrument, even when the written notes arouse the sounds in his ear.[2]

It is not by accident that I refer to this instance. Mathematics and music are closely comparable, however different the two studies may be in other respects. Both require aptitudes above all which are most definite and most easily recognizable. And let no one think that the talent of the musician rests only in the quality of his hear! The musical faculty, no less than the mathematical, requires a special intuition. An intrinsic logic regulates invention in music, and consequently its comprehension, as well as in the most abstruse calculus. Like the mathematician the composer[3] chooses from among themes offered to him those that are productive, that is to say susceptible of development. There are ideas or themes which lead to nothing; and the developments of a fertile idea not only obey known rules, but there must be a particular sense, a direct spontaneous understanding of the logic according to which they are arranged.

Let us now come to the part played in invention by the unconscious or the subconscious.

The period of unconsciousness does not indicate simply a rest, a recuperation of cerebral energy. It performs work; but what work? That is the question. It is not purely automatic since there is a choice. Is it then the unconscious which makes the choice and which thus becomes more clear sighted than the conscious? Poincaré refuses to believe so. The performance of actual work, he says, must precede the mysterious operation of the subconscious, and this very operation can be completed only in a fully conscious state. How then shall we explain the choice? According to him the results produced by the subconscious or subliminal will be those which interest the sensibility, like the esthetic sense of the mathematician; only those proposed combinations which satisfy his esthetic sense (and this indeed is very important in mathematics[4]) will pass

[2] See my "Observation sur une musicienne" in *Revue philosophique*, Sept. 1903, and *Art et psychologie individuelle* (Paris, F. Alcan, 1906).

[3] I mean especially the composer of symphonies. Dramatic music is "modulated" not "developed."

[4] In chess a bad play gives an unpleasant appearance to the chess board,

through the sieve of unconsciousness. But there is always a succession of voluntary efforts which has put the whole machine into motion and offers favorable combinations.

The eminent geometrician is entirely right, and I can not protest too strongly against the tendency of certain psychologists to exaggerate the rôle of the unconscious after it had been too much neglected. Distrust of our reason must not lead us to yield everything to instinct; nor the scorn of clear thought, to imagine any sort of obscure intelligence.

It is now many years since I myself pointed out "the positive orientation which serves as a good preparation for our system of images,"[5] and noted that this orientation presupposed a "choice."[6] I was speaking of the work of the artist and poet, but are there not the closest relations between our most widely diversified modes of creation?

Have we not all observed also what happens when we have left a task in what I shall call a state of confusion (*embrouillement*)? When we resume it we no doubt gain by the comparative rest accorded our nervous cells, but only the salient ideas, the principal points of view have survived and have taken their rank in the confused mass of our thoughts. The task already begun has been continued in our mind; a sort of purification has taken place and one last effort is enough to bring it to the point. So, borrowing M. Poincaré's comparison, the gaseous atoms put in motion by preliminary effort continue their dance after our will no longer has control, but in the direction in which it has impelled them.

If we mean that work is accomplished without us, at least it has always been prepared by us. There is a clear state of consciousness in the finishing as well as at the start.

LUCIEN ARRÉAT.

PARIS, FRANCE.

## FOUR-FOLD MAGICS.

Having read Professor Kingery's interesting article in the April *Monist*, entitled "Magic in the Fourth Dimension," I wish

but in a case of this kind visual attractiveness is affected, if I may say so, by intellectual attractiveness.

[5] *Memoire et imagination*, p. 134.

[6] *Art et psychol. indiv.*, p. 122.

to make some comments which may be of general interest.[1] In my opinion his treatment does not clearly argue out the analogy, with the result that none of his productions can be considered as a four-fold magic.

A magic square has two magic directions parallel to its sides through any cell—a row and a column; a magic cube has three magic directions parallel to its edges, a row, a column and a "line," the latter being measured at right angles to the paper-plane. By analogy, if for no other reason, a magic 4-fold should have four magic directions parallel to its linear edges, a row, a column, a line, and an "*i*." [The *i* is a convenient abbreviation for the imaginary direction, after the symbol $i = \sqrt{-1}$.] It is quite easy to determine by analogy how the imaginary direction is to be taken. If we look at a cube, set out as so many square sections on a plane, we see that the directions we have chosen to call rows and columns are shown in the square sections, and the third direction along a line is found by taking any cell in the first square plate, the similarly situated cell in the second plate, then that in the third and so on. In an octrahedroid the rows, columns and lines are given by the several cubical sections, viewed as solids, while the fourth or imaginary direction is found by starting at any cell in the first cube, passing to the corresponding cell of the second cube, then to that of the third, and so on. If we examine Professor Kingery's examples, we see that only his octahedroids of orders $4n$, i. e., $4^4$, $8^4$, are magic in the imaginary direction.

If we denote each of the nine subsidiaries of order 3 in Fig. 1 by the number in its central cell, and take the three squares 45, 1, 77, in that order, to form the plates of a first cube; 73, 41, 9 to form a second cube, and 5, 81, 37 for a third cube, we get an associated octahedroid, which is magic along the four directions parallel to its edges and on its 8 central hyperdiagonals. Comparing the above figure with Professor Kingery's Fig. 1, which is only "semi-nasik," we find the magic sum on 9 rows, 9 columns and 18 diagonals, the nine subsidiaries equally weighted and magic in rows and columns,

[1] The subject has been treated before in:

Frost (A. H.), "The Properties of Nasik Cubes," *Quarterly Journal of Mathematics*, London, 1878, p. 93.

"C. P." (C. Planck), "Magic Squares, Cubes, etc.," *The English Mechanic*, London, March 16, 1888.

Arnoux (Gabriel), *Arithmétique graphique*, Paris, 1894, Gauthier-Villars et Fils.

Planck (C.), *The Theory of Path Nasiks*, 1905. Printed for private circulation. There are copies at the British Museum, the Bodleian, Oxford, and the University Library, Cambridge.

and further the square is 9-ply, that is the nine numbers in *any* square section of order 3 give the magic sum of the great square.

It will be convenient here to turn aside and examine the evolution of the nasik idea and the general analogy between the figures of various dimensions in order that we may determine how the nasik concept ought to be expanded when we apply it in the higher dimensions. This method of treatment is suggested by Professor Kingery's remark, p. 310, "It is not easy—perhaps it is not possible—to make an absolutely perfect cube of 3." If we insist on magic central diagonals we know that, in the restricted sense, there is only one magic square of order 3, but if we reckon reflections and reversions as different there are 8. If we insist on magic central great diagonals in the cube, as by analogy we ought to do, then, in the re-

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 65 | 6 | 52 | 29 | 78 | 16 | 20 | 42 | 61 |
| 36 | 73 | 14 | 27 | 37 | 59 | 72 | 1 | 50 |
| 22 | 44 | 57 | 67 | 8 | 48 | 31 | 80 | 12 |
| 69 | 7 | 47 | 33 | 79 | 11 | 24 | 43 | 56 |
| 28 | 77 | 18 | 19 | 41 | 63 | 64 | 5 | 54 |
| 26 | 39 | 58 | 71 | 3 | 49 | 35 | 75 | 13 |
| 70 | 2 | 51 | 34 | 74 | 15 | 25 | 38 | 60 |
| 32 | 81 | 10 | 23 | 45 | 55 | 68 | 9 | 46 |
| 21 | 40 | 62 | 66 | 4 | 53 | 30 | 76 | 17 |

Fig. 1.

stricted sense, there are just 4 magic cubes of order 3. But each of these can be placed on any one of six bases and then viewed from any one of four sides, and each view thus obtained can be duplicated by reflection. In the extended sense, therefore, there are 192 magic cubes of order 3. None of these, however, has the least claim to be considered "perfect." This last term has been used with several different meanings by various writers on the subject. From the present writer's point of view the nasik idea, as presently to be developed, ought to stand pre-eminent; next in importance comes the ply property, then the adornment of magic subsidiaries, with the properties of association, bent diagonals of Franklin, etc., etc., taking subordinate places.

The lattice idea certainly goes back to prehistoric time, and what we now call the rows and columns of a rectangular lattice first appealed to man because they disclose contiguous rectilinear series of cells, that is sets of cells, whose centers are in a straight line, and each of which has linear contact with the next. It must soon have been noticed that two other series exist in every square, which fulfil the same conditions, only now the contact is punctate instead of linear. They are what we call the central diagonals. It was not until the congruent nature of the problem was realized that it became apparent that a square lattice has as many diagonals as rows and columns together. Yet the ancient Hindus certainly recognized this congruent feature. The eccentric diagonals have been called "broken diagonals," but they are really not broken if we remember that we tacitly assume all space of the dimensions under consideration saturated with contiguous replicas of the figure before us, cells similarly situated in the several replicas being considered identical. A. H. Frost[2] nearly 50 years ago invented the term "nasik" to embrace that species of square which shows magic summations on all its contiguous rectilinear series of cells, and later extended the idea by analogy to cubes,[3] and with less success to a figure in four dimensions. If the nasik criterion be applied to 3-dimensional magics what does it require? We must have 3 magic directions through any cell parallel to the edges, (planar contact), 6 such directions in the diagonals of square sections parallel to the faces (linear contact), and 4 directions parallel to the great diagonals of the cube (point contact), a total of 13 magic directions through every cell. It has long been known that the smallest square which can be nasik is of order 4, or if the square is to be associated, (that is with every pair of complementary numbers occupying cells which are equally displaced from the center of the figure in opposite directions), then the smallest nasik order is 5. Frost stated definitely[4] that in the case of a cube the smallest nasik order is 9; Arnôt[5] was of opinion that it would be 8, though he failed to construct such a magic. It is only quite recently[6] that the present writer has shown

[2] *Quarterly Journal of Mathematics*, London, 1865, and 1878, pp. 34 and 93.

[3] The idea of the crude magic cube is, of course, much older: Fermat gives a $4^3$ in his letter to Mersenne of the 1st of April, 1640. *Œuvres de Fermat*, Vol. II, p. 191.

[4] *Quarterly Journal*, Vol. XV, p. 110.

[5] *Arithmétique graphique*, Paris, 1894, p. 140.

[6] *Theory of Path Nasiks*, 1905.

that the smallest nasik order in $k$ dimensions is always $2^k$, (or $2^k+1$ if we require association).

It is not difficult to perceive that if we push the nasik analogy to higher dimensions the number of magic directions through any cell of a $k$-fold must be $\frac{1}{2}(3^k-1)$, for we require magic directions from every cell through each cell of the surrounding little $k$-fold of order 3. In a 4-fold nasik, therefore, there are 40 contiguous rectilinear summations through any cell. But how are we to determine these 40 directions and what names are we to assign to the magic figures in the 4th and higher dimensions? By far the best nomenclature for the latter purpose is that invented by Stringham,[7] who called the regular $m$-dimensional figure, which has $n$ $(m-1)$-dimensional boundaries, an $m$-fold $n$-hedroid. Thus the square is a 2-fold tetrahedroid (tetragon), the cube a 3-fold hexahedroid (hexahedron); then come the 4-fold octahedroid, the 5-fold decahedroid, and so on. Of course the 2-fold octahedroid is the plane octagon, the 3-fold tetrahedroid the solid tetrahedron; but since the regular figure in $k$ dimensions which is analogous to the square and cube has always $2k$ $(k-1)$-dimensional boundaries—is in fact a $k$-fold $2k$-hedroid—the terms octahedroid, decahedroid, etc., as applied to magics, are without ambiguity, and may be appropriately used for magics in 4, 5, etc. dimensions, while retaining the familiar "square," "cube," for the lower dimensions.

To obtain a complete knowledge of these figures, requires a study of analytical geometry of the 4th and higher dimensions, but, by analogy, on first principles, we can obtain sufficient for our purpose. If we had only a linear one-dimensional space at command we could represent a square of order $n$ in two ways, ("aspects"), either by laying the $n$ rows, in order, along our linear dimension, or by dealing similarly with the $n$ columns. In the first aspect, by rows, the cells which form any column cannot appear as contiguous, though they actually are so when we represent the figure as a square on a plane. Similarly we can represent a cube on a plane in three aspects. Suppose the paper-plane is placed vertically before us and the cube is represented by $n$ squares on that plane (P-plane aspect). We get a second aspect by taking, in order, the first column of each square to form the first square of the new aspect, all the second columns, in order, to form the second square of the new aspect, and so on (V-plane aspect). We obtain a third aspect by dealing similarly with the rows (H-plane aspect). Here the "lines," which

[7] *American Journal of Mathematics*, Vol. III, 1880.

appear as contiguous cells in the V- or H-plane aspects do not so appear in the P-plane aspect, though they actually are contiguous when we examine the cube as a solid in three dimensions. Now consider an octahedroid represented by $n$ cubes in a space of three dimensions. We get a second aspect by taking the $n$ anterior, vertical square plates of each cube, in order, to form a first new cube; the

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 34 | 74 | 15 | 65 | 6 | 52 | 24 | 43 | 56 |
| 23 | 45 | 55 | 36 | 73 | 14 | 64 | 5 | 54 |
| 66 | 4 | 53 | 22 | 44 | 57 | 35 | 75 | 13 |
| 20 | 42 | 61 | 33 | 79 | 11 | 70 | 2 | 51 |
| 72 | 1 | 50 | 19 | 41 | 63 | 32 | 81 | 10 |
| 31 | 80 | 12 | 71 | 3 | 49 | 21 | 40 | 62 |
| 69 | 7 | 47 | 25 | 38 | 60 | 29 | 78 | 16 |
| 28 | 77 | 18 | 68 | 9 | 46 | 27 | 37 | 59 |
| 26 | 39 | 58 | 30 | 76 | 17 | 67 | 8 | 48 |

Fig. 2. $P_1$- and $P_2$-aspects.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 69 | 20 | 34 | 7 | 42 | 74 | 47 | 61 | 15 |
| 28 | 72 | 23 | 77 | 1 | 45 | 18 | 50 | 55 |
| 26 | 31 | 66 | 39 | 80 | 4 | 58 | 12 | 53 |
| 25 | 33 | 65 | 38 | 79 | 6 | 60 | 11 | 52 |
| 68 | 19 | 36 | 9 | 41 | 73 | 46 | 63 | 14 |
| 30 | 71 | 22 | 76 | 3 | 44 | 17 | 49 | 57 |
| 29 | 70 | 24 | 78 | 2 | 43 | 16 | 51 | 56 |
| 27 | 32 | 64 | 37 | 81 | 5 | 59 | 10 | 54 |
| 67 | 21 | 35 | 8 | 40 | 75 | 48 | 62 | 13 |

Fig. 3. V-aspect.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 69 | 7 | 47 | 28 | 77 | 18 | 26 | 39 | 58 |
| 20 | 42 | 61 | 72 | 1 | 50 | 31 | 80 | 12 |
| 34 | 74 | 15 | 23 | 45 | 55 | 66 | 4 | 53 |
| 25 | 38 | 60 | 68 | 9 | 46 | 30 | 76 | 17 |
| 33 | 79 | 11 | 19 | 41 | 63 | 71 | 3 | 49 |
| 65 | 6 | 52 | 36 | 73 | 14 | 22 | 44 | 57 |
| 29 | 78 | 16 | 27 | 37 | 59 | 67 | 8 | 48 |
| 70 | 2 | 51 | 32 | 81 | 10 | 21 | 40 | 62 |
| 24 | 43 | 56 | 64 | 5 | 54 | 35 | 75 | 13 |

Fig. 4. H-aspect.

$n$ plates immediately behind the anterior plate in each cube to form a second new cube, and so on. Evidently we obtain a third aspect, in like manner, by slicing each cube into vertical, antero-posterior plates, and a fourth aspect by using the horizontal plates. Carrying on the same reasoning, it becomes clear that we can represent a $k$-fold of order $n$, in $k$—1 dimensions, by $n$ ($k$—1)-folds, in $k$ dif-

ferent aspects. Thus we can represent a 5-fold decahedroid of order $n$, in 4-dimensional space, by $n$ 4-fold octahedroids, and this in 5 different ways or aspects.

Return now to Fig. 1 and the rule which follows it, for forming from it the magic octahedroid of order 3. If we decide to represent the three cubic sections of the octahedroid by successive columns of squares we get Fig. 2.

If we obtain a second aspect by using the square plates of the paper-plane, as explained above, we find that this is equivalent to taking the successive rows of squares from Fig. 2 to form our three cubes, instead of taking the columns of squares. Thus the presentation plane shows two different aspects of an octahedroid; this is due to the fact that the fourth dimension is the square of the second. We may call these aspects $P_1$- and $P_2$-aspects. The aspect obtained by using antero-posterior vertical planes is shown in Fig. 3, that from horizontal planes in Fig. 4. We may call these the V- and H-aspects. If we use the rows of squares in Figs. 3 or 4 we get correct representations of the octahedroid, but these are not new aspects, they are merely repetitions of $P_1$, for they give new views of the same three cubes as shown in $P_1$. In the same way, if we turned all the P-plane plates of a cube upside down we should not call that a new aspect of the cube. The aspects $P_2$, V, H can be obtained from $P_1$ by turning the octahedroid as a whole in 4-dimensional space, just as the V-plane and H-plane aspects of a cube can be obtained from the P-plane aspect by turning the cube in 3-dimensional space. Fig. 4, above, is Fig. 2 turned through a right angle about the plane of $xy$; we can turn about a plane in 4 dimensions just as we turn about a straight line in 3 dimensions or about a point in 2 dimensions. It will be noticed that in the four aspects each of the 4 directions parallel to an edge becomes in turn imaginary, so that it cannot be made to appear as a series of contiguous cells in 3-dimensional space; yet if we had a 4-dimensional space at command, these four directions could all be made to appear as series of contiguous cells. There is one point, however, which must not be overlooked. When we represent a cube as so many squares, the rows and columns appear as little squares having linear contact, but actually, in the cube, the cells are all cubelets having planar contact. Similarly, in an octahedroid represented as so many cubes the rows and columns appear as cubelets having planar contact, but in the octa-

hedroid the cells are really little octahedroids having solid, 3-dimensional contact.

When we examine the above octahedroid (Figs. 2-4) in all its aspects we see that there are through every cell 4 different directions parallel to the edges, 12 directions parallel to the diagonals of the square faces, and 16 directions parallel to the great diagonals of the several cubical sections. There remain for consideration the hyperdiagonals, which bear to the octahedroid the same relation that the great diagonals bear to a cube. If we represent a cube by squares on a plane we can obtain the great diagonals by starting at any corner cell of an outside plate, then passing to the next cell of the corresponding diagonal of the succeeding plate, and so on. Similarly we obtain the hyperdiagonals of the octahedroid by starting from any corner cell of an outside cube, passing to the next cell on the corresponding great diagonal of the succeeding cube, and so on. Evidently there are 8 central hyperdiagonals, for we can start at any one of the 8 corners of one outside cube and end at the opposite corner of the other outside cube. There are therefore, through any cell, 8 different directions parallel to the central hyperdiagonals. With the directions already enumerated this makes a total of 40 directions through each cell and agrees with the result already stated.[8] Evidently the number of $k$-dimensional diagonals of a $k$-fold is $2^{k-1}$, and if the analogy with the magic square is to be carried through then all the central $k$-dimensional diagonals of a $k$-fold ought always to be magic. It is here that Professor Kingery's $4^4$ and $8^4$ fail; they are not magic on their central hyperdiagonals.

The smallest octahedroid which can have all these 40 directions magic is $16^4$, and the writer has given one of the 256 square plates of this magic and a general formula by which the number occupying any specified cell can be determined. But it will be interesting to determine how nearly we can approach this ideal in the lower orders. The octahedroid of order 3 can be but crude, and practically Fig. 2 cannot be improved upon. All rows, columns, lines, and "$i$"s are magic, and likewise the 8 central hyper-diagonals. Of course, since the figure is associated, all central rectilinear paths are magic, but

[8] If we call the diagonals in square sections parallel to faces 2-dimensional, those parallel to the great diagonals of cubical sections 3-dimensional, etc., etc., then the number of $m$-dimensional diagonals of a $k$-fold is $2^{m-1}k!/m!(k-m)!$ In fact the number required is the $(m+1)$th term of the expansion of $\frac{1}{2}(1+2)^k$. It will be noticed that this reckons rows, columns etc. as "diagonals of one dimension."

this is of little account and other asymmetrical magic diagonal summations are purely accidental and therefore negligible.

Turning to the next odd order, 5: Professor Kingery's Fig. 2 is not a magic octahedroid as it stands, but a magic can be obtained from it by taking the diagonals of subsidiary squares to form the 5 cubes. Denoting each subsidiary by the number in its central cell, we may use 602, 41, 210, etc. for the first cube; 291, 460 etc. for

| | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 495 | 58 | 271 | 589 | 152 | 478 | 66 | 259 | 597 | 165 | 436 | 54 | 267 | 585 | 173 | 499 | 62 | 255 | 593 | 156 | 482 | 75 | 263 | 576 | 169 |
| 178 | 391 | 84 | 297 | 615 | 186 | 379 | 92 | 285 | 623 | 199 | 387 | 80 | 293 | 606 | 182 | 400 | 88 | 276 | 619 | 195 | 383 | 96 | 289 | 602 |
| 511 | 204 | 417 | 110 | 323 | 524 | 212 | 405 | 118 | 306 | 507 | 225 | 413 | 101 | 319 | 520 | 208 | 421 | 114 | 302 | 503 | 216 | 409 | 122 | 315 |
| 349 | 537 | 230 | 443 | 6 | 332 | 550 | 238 | 426 | 19 | 345 | 533 | 246 | 439 | 2 | 328 | 541 | 234 | 447 | 15 | 336 | 529 | 242 | 435 | 23 |
| 32 | 375 | 563 | 126 | 469 | 45 | 358 | 571 | 139 | 452 | 28 | 366 | 559 | 147 | 465 | 36 | 354 | 567 | 135 | 473 | 49 | 362 | 555 | 143 | 456 |
| 70 | 258 | 596 | 164 | 477 | 53 | 266 | 584 | 172 | 490 | 61 | 254 | 592 | 160 | 498 | 74 | 262 | 580 | 168 | 481 | 57 | 275 | 588 | 151 | 494 |
| 378 | 91 | 284 | 622 | 190 | 386 | 79 | 292 | 610 | 198 | 399 | 87 | 280 | 618 | 181 | 382 | 100 | 288 | 601 | 194 | 395 | 83 | 296 | 614 | 177 |
| 211 | 404 | 117 | 310 | 523 | 224 | 412 | 105 | 318 | 506 | 207 | 425 | 113 | 301 | 519 | 220 | 408 | 121 | 314 | 502 | 203 | 416 | 109 | 322 | 515 |
| 549 | 237 | 430 | 18 | 331 | 532 | 250 | 438 | 1 | 344 | 545 | 233 | 446 | 14 | 327 | 528 | 241 | 434 | 22 | 340 | 536 | 229 | 442 | 10 | 348 |
| 357 | 575 | 138 | 451 | 44 | 370 | 558 | 146 | 464 | 27 | 353 | 566 | 134 | 472 | 40 | 361 | 554 | 142 | 460 | 48 | 374 | 562 | 130 | 468 | 31 |
| 270 | 583 | 171 | 489 | 52 | 253 | 591 | 159 | 497 | 65 | 261 | 579 | 167 | 485 | 73 | 274 | 587 | 155 | 493 | 56 | 257 | 600 | 163 | 476 | 69 |
| 78 | 291 | 609 | 197 | 390 | 86 | 279 | 617 | 185 | 398 | 99 | 287 | 605 | 193 | 381 | 82 | 300 | 613 | 176 | 394 | 95 | 283 | 621 | 189 | 377 |
| 411 | 104 | 317 | 510 | 223 | 424 | 112 | 305 | 518 | 206 | 407 | 125 | 313 | 501 | 219 | 420 | 108 | 321 | 514 | 202 | 403 | 116 | 309 | 522 | 215 |
| 249 | 437 | 5 | 343 | 531 | 232 | 450 | 13 | 326 | 544 | 245 | 433 | 21 | 339 | 527 | 228 | 441 | 9 | 347 | 540 | 236 | 429 | 17 | 335 | 548 |
| 557 | 150 | 463 | 26 | 369 | 570 | 133 | 471 | 39 | 352 | 553 | 141 | 459 | 47 | 365 | 561 | 129 | 467 | 35 | 373 | 574 | 137 | 455 | 43 | 356 |
| 595 | 158 | 496 | 64 | 252 | 578 | 166 | 484 | 72 | 265 | 586 | 154 | 492 | 60 | 273 | 599 | 162 | 480 | 68 | 256 | 582 | 175 | 488 | 51 | 269 |
| 278 | 616 | 184 | 397 | 90 | 286 | 604 | 192 | 385 | 98 | 299 | 612 | 180 | 393 | 81 | 282 | 625 | 188 | 376 | 94 | 295 | 608 | 196 | 389 | 77 |
| 111 | 304 | 517 | 210 | 423 | 124 | 312 | 505 | 218 | 406 | 107 | 325 | 513 | 201 | 419 | 120 | 308 | 521 | 214 | 402 | 103 | 316 | 509 | 222 | 415 |
| 449 | 12 | 330 | 543 | 231 | 432 | 25 | 338 | 526 | 244 | 445 | 8 | 346 | 539 | 227 | 428 | 16 | 334 | 547 | 240 | 436 | 4 | 342 | 535 | 248 |
| 132 | 475 | 38 | 351 | 569 | 145 | 458 | 46 | 364 | 552 | 128 | 466 | 34 | 372 | 565 | 136 | 454 | 42 | 360 | 573 | 149 | 462 | 30 | 368 | 556 |
| 170 | 483 | 71 | 264 | 577 | 153 | 491 | 59 | 272 | 590 | 161 | 479 | 67 | 260 | 598 | 174 | 487 | 55 | 268 | 581 | 157 | 500 | 63 | 251 | 594 |
| 603 | 191 | 384 | 97 | 290 | 611 | 179 | 392 | 85 | 298 | 624 | 187 | 380 | 93 | 281 | 607 | 200 | 388 | 76 | 294 | 620 | 183 | 396 | 89 | 277 |
| 311 | 504 | 217 | 410 | 123 | 324 | 512 | 205 | 418 | 106 | 307 | 525 | 213 | 401 | 119 | 320 | 508 | 221 | 414 | 102 | 303 | 516 | 209 | 422 | 115 |
| 24 | 337 | 530 | 243 | 431 | 7 | 350 | 538 | 226 | 444 | 20 | 333 | 546 | 239 | 427 | 3 | 341 | 534 | 247 | 440 | 11 | 329 | 542 | 235 | 448 |
| 457 | 50 | 363 | 551 | 144 | 470 | 33 | 371 | 564 | 127 | 453 | 41 | 359 | 572 | 140 | 461 | 29 | 367 | 560 | 148 | 474 | 37 | 355 | 568 | 131 |

Fig. 5.

the second cube; 85, 149, etc. for the middle cube, etc., etc. But few of the plane diagonals through any cell of this octahedroid are magic. In fact no octahedroid of lower order than 8 can have all its plain diagonals magic; but by sacrificing this property we can obtain a $5^4$ with many more magic properties than the above.

In Fig. 5 the great square is magic, nasik and 25-ply: the 25 subsidiaries are purposely not nasik, but they are all magic in rows

and columns. If we take up the subsidiaries in the way just described, viz., 513, 221, etc., for the first cube; 205, 413, etc., for the second cube, and so on, we get a $5^4$, which has 20 contiguous rectilinear summations through any cell, viz., the 4 directions parallel to the edges and the whole of the 16 three-dimensional diagonals parallel to the great diagonals of any cubical section. If the reader will write out the four aspects of the octahedroid, in the way already explained, he will be able to verify this statement. As an example, the 20 summations through the cell containing the number 325, which lies in the first plate of the first cube of the $P_1$ aspect, are here shown:

| ROW | COLUMN | LINE | DIAG. | CUBICAL DIAGONALS | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | $P_1$ ASPECT | | | | $P_2$ ASPECT | | | | V ASPECT | | | | H ASPECT | | | |
| 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 |
| 513 | 8 | 508 | 512 | 534 | 388 | 607 | 3 | 538 | 392 | 611 | 7 | 533 | 387 | 608 | 4 | 413 | 103 | 507 | 509 |
| 201 | 466 | 216 | 204 | 143 | 576 | 169 | 456 | 126 | 589 | 152 | 469 | 141 | 579 | 166 | 458 | 501 | 406 | 219 | 218 |
| 419 | 154 | 404 | 416 | 477 | 44 | 451 | 164 | 494 | 31 | 468 | 151 | 479 | 41 | 454 | 162 | 119 | 214 | 401 | 402 |
| 107 | 612 | 112 | 108 | 86 | 232 | 13 | 617 | 82 | 228 | 9 | 613 | 87 | 233 | 12 | 616 | 207 | 517 | 113 | 111 |

Since there are 20 magic summations through each of the 625 cells and each summation involves 5 cells, the total number of different symmetrical magic summations in this octahedroid is 2500. This does not include the 8 central hyperdiagonals, which are also magic, for this is not a symmetrical property since *all* the hyperdiagonals are not magic.

The next odd order, 7, was the one which Frost attacked. Glass models of his 7 cubes were for many years to be seen at the South Kensington Museum, London, and possibly are still there. He does not appear to have completely grasped the analogy between magics in 3 and 4 dimensions, and from the account he gives in *The Quarterly Journal*, he evidently assumed that the figure was magic on all its plane diagonals. Actually it is magic on all plane diagonals only in the P-aspect; in the other 3 aspects it is nasik in one set of planes but only semi-nasik in the other two sets of planes, therefore of the 12 plane diagonals through any cell of the octahedroid only 9 are magic.[9] Frost obtained his figure by direct application of the method of paths; the present writer using the method of formative square has obtained an example with one additional plane magic diagonal. It is shown as a great square of order

[9] Probably the reader will have already noticed that although there are 4 aspects, and 6 plane diagonals appear in each aspect, yet there are only 12 plane diagonals in all, since, with this method of enumeration, each diagonal occurs twice.

49, magic on its 49 rows, 49 columns and 98 diagonals, and 49-ply, that is *any* square bunch of 49 numbers gives the same sum as a row or column. The 49 subsidiaries are equally weighted nasiks, magic on their 7 rows, 7 columns and 14 diagonals. If the subsidiaries be taken up along the Indian paths, as in the previous examples, we get 7 cubes forming an octahedroid of order 7. This is magic on the 4 directions parallel to the edges, is completely plane nasik in the $P_1$ and $P_2$ aspects, and in the other two aspects it is nasik in two sets of planes and crude in the third set. Therefore of the 12 plane diagonals through any cell 10 are magic. It is practically certain that we can go no further in this direction with this order, but by giving up the magic plane diagonals we can, as with $5^4$ above, obtain a larger number of magic summations on the higher diagonals.

When we consider the even orders we find those $\equiv 2 \pmod 4$ of little interest. The powerful methods used for the other orders are now useless if we insist on using consecutive numbers: we must employ other methods. Professor Kingery's Fig. 4 cannot be made into a magic octahedroid by any shuffling of its subsidiaries. The best methods here, are either to use an extension of Thompson's method of pseudo-cubes, as employed by Mr. Worthington in his construction of $6^3$ (*The Monist*, XX, pp. 303-309),[10] or, best of all, to use the method of reversions.

With orders $\equiv 0 \pmod 4$ we can give a greater number of ornate features than with any other orders. We quote one example below (Fig. 6).

The columns of Fig. 6 give the 4 cubes of an octahedroid of order 4, which is crude in plane diagonals, but is magic on every other contiguous rectilinear path, it has therefore 28 such paths through each cell. The 28 magic paths through the cell containing the number 155 are displayed below.

| ROW | COLUMN | LINE | $\nearrow$ | CUBICAL DIAGONALS | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | $P_1$ ASPECT | | | | $P_2$ ASPECT | | | | V ASPECT | | | | H ASPECT | | | |
| 155 | 155 | 155 | 155 | 155 | 155 | 155 | 155 | 155 | 155 | 155 | 155 | 155 | 155 | 155 | 155 | 155 | 155 | 155 | 155 |
| 38 | 70 | 98 | 101 | 2 | 50 | 242 | 194 | 5 | 53 | 245 | 197 | 77 | 125 | 113 | 65 | 36 | 33 | 225 | 228 |
| 91 | 171 | 151 | 154 | 103 | 103 | 103 | 103 | 106 | 106 | 106 | 106 | 166 | 166 | 166 | 166 | 86 | 86 | 86 | 86 |
| 230 | 118 | 110 | 104 | 254 | 206 | 14 | 62 | 248 | 200 | 8 | 56 | 116 | 68 | 80 | 128 | 237 | 240 | 48 | 45 |

[10] It was by this method that Firth in the 80's constructed what was, almost certainly, the first correct magic cube of order 6. *Mr. Worthington's introduction of magic central diagonals on all the faces is new. Though, of course, not a symmetrical summation, this is a very pleasing feature.*

| HYPERDIAGONALS | | | | | | | |
|---|---|---|---|---|---|---|---|
| 155 | 155 | 155 | 155 | 155 | 155 | 155 | 155 |
| 256 | 208 | 16 | 64 | 253 | 205 | 13 | 61 |
| 102 | 102 | 102 | 102 | 102 | 102 | 102 | 102 |
| 1 | 49 | 241 | 193 | 4 | 52 | 244 | 196 |

| | | | |
|---|---|---|---|
| 1 | 128 | 193 | 192 |
| 240 | 145 | 48 | 81 |
| 49 | 80 | 241 | 144 |
| 224 | 161 | 32 | 97 |

| | | | |
|---|---|---|---|
| 254 | 131 | 62 | 67 |
| 19 | 110 | 211 | 174 |
| 206 | 179 | 14 | 115 |
| 35 | 94 | 227 | 158 |

| | | | |
|---|---|---|---|
| 4 | 125 | 196 | 189 |
| 237 | 148 | 45 | 84 |
| 52 | 77 | 244 | 141 |
| 221 | 164 | 29 | 100 |

| | | | |
|---|---|---|---|
| 255 | 130 | 63 | 66 |
| 18 | 111 | 210 | 175 |
| 207 | 178 | 15 | 114 |
| 34 | 95 | 226 | 159 |

| | | | |
|---|---|---|---|
| 248 | 137 | 56 | 73 |
| 25 | 104 | 217 | 168 |
| 200 | 185 | 8 | 121 |
| 41 | 88 | 233 | 152 |

| | | | |
|---|---|---|---|
| 11 | 118 | 203 | 182 |
| 230 | 155 | 38 | 91 |
| 59 | 70 | 251 | 134 |
| 214 | 171 | 22 | 107 |

| | | | |
|---|---|---|---|
| 245 | 140 | 53 | 76 |
| 28 | 101 | 220 | 165 |
| 197 | 188 | 5 | 124 |
| 44 | 85 | 236 | 149 |

| | | | |
|---|---|---|---|
| 10 | 119 | 202 | 183 |
| 231 | 154 | 39 | 90 |
| 58 | 71 | 250 | 135 |
| 215 | 170 | 23 | 106 |

| | | | |
|---|---|---|---|
| 13 | 116 | 205 | 180 |
| 228 | 157 | 36 | 93 |
| 61 | 68 | 253 | 132 |
| 212 | 173 | 20 | 109 |

| | | | |
|---|---|---|---|
| 242 | 143 | 50 | 79 |
| 31 | 98 | 223 | 162 |
| 194 | 191 | 2 | 127 |
| 47 | 82 | 239 | 146 |

| | | | |
|---|---|---|---|
| 16 | 113 | 208 | 177 |
| 225 | 160 | 33 | 96 |
| 64 | 65 | 256 | 129 |
| 209 | 176 | 17 | 112 |

| | | | |
|---|---|---|---|
| 243 | 142 | 51 | 78 |
| 30 | 99 | 222 | 163 |
| 195 | 190 | 3 | 126 |
| 46 | 83 | 238 | 147 |

| | | | |
|---|---|---|---|
| 252 | 133 | 60 | 69 |
| 21 | 108 | 213 | 172 |
| 204 | 181 | 12 | 117 |
| 37 | 92 | 229 | 156 |

| | | | |
|---|---|---|---|
| 7 | 122 | 199 | 186 |
| 234 | 151 | 42 | 87 |
| 55 | 74 | 247 | 138 |
| 218 | 167 | 26 | 103 |

| | | | |
|---|---|---|---|
| 249 | 136 | 57 | 72 |
| 24 | 105 | 216 | 169 |
| 201 | 184 | 9 | 120 |
| 40 | 89 | 232 | 153 |

| | | | |
|---|---|---|---|
| 6 | 123 | 198 | 187 |
| 235 | 150 | 43 | 86 |
| 54 | 75 | 246 | 139 |
| 219 | 166 | 27 | 102 |

Fig. 6.

But this does not exhaust the magic properties, for this figure is 4-ply in every plane section parallel to any face of the octahedroid. If the reader will examine the figure in its four aspects he will find that 6 such planes can be drawn through any cell, and since a given number is a member of four different 4-ply bundles in each plane, it follows that each number is a member of 24 different bundles. If we add the 28 rectilinear summations through any cell we see

that each of the 256 numbers takes part in 52 different summations. The total number of different magic summations in the octahedroid is therefore $\frac{256 \times 52}{4} = 3328$. The six planes parallel to the faces through 155 are shown in Fig. 7, and from them the 24 different bundles in which 155 is involved can be at once determined.

| | | | |
|---|---|---|---|
| 11 | 118 | 203 | 182 |
| 230 | 155 | 38 | 91 |
| 59 | 70 | 251 | 134 |
| 214 | 171 | 22 | 107 |

| | | | |
|---|---|---|---|
| 19 | 110 | 211 | 174 |
| 230 | 155 | 38 | 91 |
| 31 | 98 | 223 | 162 |
| 234 | 151 | 42 | 87 |

| | | | |
|---|---|---|---|
| 131 | 118 | 143 | 122 |
| 110 | 155 | 98 | 151 |
| 179 | 70 | 191 | 74 |
| 94 | 171 | 82 | 167 |

| | | | |
|---|---|---|---|
| 25 | 104 | 217 | 168 |
| 230 | 155 | 38 | 91 |
| 28 | 101 | 220 | 165 |
| 231 | 154 | 39 | 90 |

| | | | |
|---|---|---|---|
| 137 | 118 | 140 | 119 |
| 104 | 155 | 101 | 154 |
| 185 | 70 | 188 | 71 |
| 88 | 171 | 85 | 170 |

| | | | |
|---|---|---|---|
| 145 | 110 | 148 | 111 |
| 104 | 155 | 101 | 154 |
| 157 | 98 | 160 | 99 |
| 108 | 151 | 105 | 150 |

Fig. 7.

The reader might object that the border cells of a square section cannot be involved in 4 bundles of that section; but this would be to overlook the congruent property. The number 107, which occupies a corner cell of the first section given above is contained in the following bundles:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 251 | 134 | | 134 | 59 | | 22 | 107 |
| 22 | 107 | | 107 | 214 | | 203 | 182 |

| | | | |
|---|---|---|---|
| 107 | 214 | | |
| 182 | 11 | | |

It is noticeable that the four corner cells of a square form one of its 4-ply bundles.

It would have been desirable to indicate the methods by which the above examples have been constructed, but exigencies of space forbid. The four orders dealt with, 3, 5, 7, 4, were all obtained in different ways. Fig. 6 was constructed by direct application, in four dimensions, of the method of paths; in fact, it is the octahedroid

$$\begin{vmatrix} 2 & 2 & 2 & 1 \\ 2 & 2 & 1 & 2 \\ 2 & 1 & 2 & 2 \\ 1 & 2 & 2 & 2 \end{vmatrix}_4.$$

The whole of its magic properties may be deduced by examination

of the determinant and its adjoint, without any reference to the constructed figure. There is therefore nothing empirical about this method.

C. PLANCK.

HAYWARD'S HEATH, ENGLAND.

## BJOERKLUND'S "DEATH AND RESURRECTION."

The résumé and discussion of the above book* with reference to and contrast with the writings and position of Dr. Carus, by Mr. J. E. Fries in *The Monist,* April issue, is deeply interesting. The book itself is absorbingly so, evidencing large knowledge in research and much independent thinking. It may not be conceded, however, as convincing in establishment of the thesis in theory—the soul as a thing or matter of the cells. The author's discussion scarce touches the soul, stopping short of the thing in pursuit, but with an incompetent substitute. Cells are given individual but not *independent* existence, and on that ground alone the cell is incompetent as basic to the soul.

Mr. Fries begins with the "life-force," and the Editor's earlier published article "Life and the Soul," and the point in antagonism with Dr. Carus is emphasized that "life has no roots whatever in the material world." Surely "a strange statement" this! Dr. Carus is quoted as follows: "Living bodies consist of the very same materials of which the rest of the world is composed," which physics and chemistry make certain. The "life phenomenon is *sui generis*"; this, too, science concedes. Again "...life is a manifestation of energy which forms a category of its own" etc., a not pronounced materialism this, surely. Here, then, is life-force *sui generis* yet natural, no mysticism or supernaturalism involved or required.

To the somewhat equivocal question, "With no other resources than the material world to fall back upon, how then did life grow out of matter and physical energy?" it is answered: "Surely we must look beyond the boundaries of the visible world." To this it may be replied: Energy is not of category with matter and the visible. Within the cosmic world, however, are found both matter and energy, and whatever other factor may be essential to the "origin and substance of life." The cosmical is the natural, and

* *Death and Resurrection from the Point of View of the Cell-Theory* by Gustaf Björklund. Translated from the Swedish by J. E. Fries. Chicago, Open Court Pub. Co., 1910.

with no necessary supernaturalism, in factor or fact. Science is leading to the monism of but *one* energy or force in the universe—varied in form or manifestation. To pit the psychic or spiritual against the material, with kinds of force in consonance, involves in confusion, and a divided house that cannot stand.

Soul and life, consciousness and energy are not synonymous or correlative. But neither is soul nor consciousness nor thought without energy. Kant's *pure* and *transcendant* are simply categories of degree, not kind. All reason is reasoning, all sentiment is sentimental, be it angelic or devilish.

It follows, then, that there is no need to go outside the cosmical world to find the roots or elements of life, or the source and origin of all that is possible to thought manipulation. Life, and the human soul and mind are the most natural of things, and the supernatural, at least in the banal sense it has acquired, may be dispensed with and no loss felt.

Mr. Fries quotes from the book: "...all organic matter is a product of art, that is, a product which the forces of nature cannot spontaneously produce...a foreign interference is necessary." Now, it is certain that there are no other than the forces of nature to effect these products. As certain also is there the psychic or *art* factor in the effecting of the organic matter. But this psychic or *art* factor is *not* a *living will,* or, as later on designated, soul, as the author should himself have seen. He says: "Will and physical forces then stand against each other as two fundamentally and radically different causes. A will may neglect to do what it ought to, may be idle, industrious, undecided; a physical force cannot leave undone what it has to do, can never be called idle, industrious or undecided." To be sure that is so. Such a "will," therefore, cannot be in organic connection with a physiological or living thing, because it achieves its end as an organism harmoniously, and completely in and of itself. No factor of the physiological organism *stands against* any other factor in their entire *ensemble,* as such *organization* is regal here. The *end,* purposed in the organic is not present to the organism in the *form of idea* (W. R. Sorley). There is no *soul,* no *living will* in the physiological; notwithstanding there is the psychic or art factor, *objective* with all other factors of the organism as such, or in its primalism. This objective psychic or art factor is a qualitative property or power of life-force and may well constitute it *special,* having this specific manifestation. Being of and with the life energy, it is ubiquitous as the cell and initiates the directivity to the func-

tional intracellularly—as evidenced by all physiology, plant or animal.

Björklund's error is simple enough in his premises, and he has a *soul* in every cell—his explaining away a multitude of souls is quite inconclusive. His error is in not seeing that life-force, *sui generis* as it is, is simply the physical energy—he is pleased to term it—in directivity by complexing of the psychic or *art* factor, which he interprets as *soul,* and Sir Oliver Lodge, equally mistaken, designates the "formative principle of the organism."

Life-force, without *soul,* or *living will,* is competent to the whole of the physiological as a phenomenon. Possibly *feelings,* correctly interpreted, but certainly not *sentiments* and *thoughts* are the manifestations of life-force. Life-force as embodied in living matter in germ status of every grade, is fully competent to the whole of the physiological of its grade, but of *nothing beyond.* The "foreign interference" of the author, correctly conceived and stated, is *a new departure in the evolutional.* The origin of life marked an epoch in cosmic evolution. The advent or coming into entity of the human soul was another "foreign interference" equally epochal evolutionally. This was attained by the complexing of the physiological with a psychism *subjective* in status and rôle. Initial and basic in the concept of soul and mind is this *subjectivity.* The physiological is wholly *objective*—contingency and the stereotyped obtain, directed by the psychic factor which is a *constituent of the organism.* The fact of the *go* of the physiological is the hint of the soul and mind, yet there is no *soul* or *living will,* because all is *objective.* Let the mind sweep through all the vault of the cosmos, and but a single subjective factor or phenomenon is found—*man,* the human soul, a living will. He is *subjective*; he does things; mind is creative. The soul or mind is distinct in concept and in essence, in being, from the physiological. In non-connection, yet in vital and organized relation and association with, and in evolution by means of the organization effective in the physiological. The cell provides for, is effective in, development of body and brain; but soul and mind are not of the cell or brain. Soul, a psychism in subjectivity has basis in immediacy with the functional. The theory and discussion of it in *Death and Resurrection* must be reconsidered and reconstructed to be in consonance with the facts, and so to be of "any special value to religious or emotional life" (Carus).

JOSEPH CLEMENTS, M. D.

WICHITA, KANSAS.

## THE HISTORICITY OF JESUS.

IN COMMENT UPON THE THEORY OF PROF. WILLIAM BENJAMIN SMITH.

Theology seems to be sufficiently remote from mathematics, and yet it appears that the two join hands in the mind of an American scholar, William Benjamin Smith, who by profession is a mathematician but by preference a theologian. He is a professor of Tulane University in New Orleans, La., where for many years he held the chair of mathematics and has only recently been transferred to the faculty of philosophy. He takes considerable interest in the philosophy of mathematics, but has it tempered by studies in the origin of Christianity. His special attention is concentrated upon the figure of Jesus in the Gospels, and he has published a work in German under the title "The Pre-Christian Jesus" (*Der vorchristliche Jesus*) in which he attempts to prove that Jesus never lived. His theory differs, however, from older ones which claim that Jesus was a solar myth, in that his studies are based upon a thorough text criticism of the New Testament supported by stupendous scholarship in the field of patristic and Apocryphal literature.

Professor Smith has stirred Germany through Professor Drews of Carlsruhe, Baden, who not only published a book entitled "The Christ Myth," but also began a campaign of lectures in which he challenged the old believers to defend the historicity of Jesus. Orthodox Berlin was shaken from its lethargic indifference by his debates which attracted large crowds and filled many columns of the daily press.

Professor Drews bases his contention mainly upon Professor Smith's book, and in recapitulating the state of things he expresses his views as follows:

"Finally the American William B. Smith, in his work *Der vorchristliche Jesus* (1906) has cast so bright a light on a number of weighty factors in the origin of Christianity and has illuminated so many points that permit us a deeper insight into the actual course of events that we gradually begin to see clearly in this matter" (page iii in the preface).

It is natural that this attack on the historicity of Jesus should have found many antagonists, but strange to say it found among the very opponents of Professor Smith's theory some who advocated its investigation. Prof. A. Jülicher, well known among theologians, makes the following statement in his pamphlet "Did Jesus Live?" page 1:

"In the last decade, after some predecessors of little consequence, a series of distinguished savants in America and Germany have come forward with powerful attacks upon the whole traditional conception of Jesus, foremost among them William B. Smith in his *Der vorchristliche Jesus.*"

The radical press shows itself inclined to endorse the position of Smith, as for instance Wilhelm von Schnehen in *Das freie Wort*, Vol. VIII, No. 16, page 623, who praises Smith's theory as a "decisive blow" to the antiquated views, but liberal theologians have come forth as his most doughty enemies. And this is but natural, for while Smith sees in Jesus the humanization of a god, the liberal Christian sees in Christ the deification of Jesus, a noble and pure hearted idealist. Unitarians may not believe in Christ, the God made flesh, but they believe in Jesus, the man, a paragon of moral perfection; and the humanity of Jesus together with his historicity is the salient point of their creed.

Professor Smith is known to our readers through several articles published in *The Open Court* and *The Monist*, and it is not easy to refute his theories. We agree with him so far as his positive contentions go, but we demur to his negation. We agree that the Christ ideal is pre-Christian. The idea of a Saviour among the pagans and the hope for the Messiah among the Jews do not date at the beginning of the Christian era, but can be traced almost everywhere in profane and sacred literature, not of the Jews alone, but mainly of the Gentiles; and this ideal of a Saviour has entered into the fabric of the story of Jesus as preserved in the Gospels.

Professor Smith, however, goes one step farther. He claims not only the pre-Christian existence of the Christ ideal, but also of a Jesus, and there are many things which speak in his favor. Among them he maintains for instance that the definite article prefixed to the word Jesus indicates that "Jesus" like "Christ" was a title and not a name; therefore he is spoken of as "the Jesus." Further he would explain the whole story of the Gospels as being the result of symbolism, and in the present article he discusses evidences that can be deduced from the silence of Josephus and Tacitus.

Jesus is nowhere mentioned in the profane literature of the Gentiles; he is unknown to history. This is a truth accepted by scholars, but not universally known, and its significance has not yet been pointed out. Professor Cornill, one of the higher critics, who is an avowed Christian, says:

"I assume that my esteemed readers are already aware of the

fact that Abbot Dionysius Exiguus, who in the sixth century calculated the Christian era according to which we still universally reckon time, erred in his establishment of the year of Christ's birth, placing it several years, probably five, if not seven, too late. It is positively certain that Herod died in the year 4 before our era; if, therefore, Jesus was born during his reign—and there is no reason for doubting this tradition—the conclusion is unavoidable that the date commonly assigned for the birth of Christ is wrong. The place of Jesus's birth is just as much a matter of uncertainty as the time; and so is the year of his death,—in this latter point reports and estimates vary a matter of seven years, from 29 to 36 A. D.

"It is downright providential that we know so little from the historical and biographical point of view concerning this greatest life that was ever lived on earth. Thus every possibility is to be precluded of our falling into the delusion that we know him in knowing the date of his birth and of his death and the outward circumstances of his life; he is to stand before us simply in his work.

"The life and activity of Jesus fell into the period of Jewish history which is to occupy our attention in this chapter, and his activity was possible only on the soil of Israel and among the Jewish people; but yet a history of the people of Israel is not the place in which to speak of him. He swept across the hopelessly darkened sky of Israel like a meteor, flashing and vanishing; he had no effect upon the history of the Jewish people, and the fact that he did not do this, that he deliberately refused to do so, became, humanly speaking, his doom."

Though Jesus was historical, though he was a real man, he was not an historical figure. His life was passed in the obscurity of a small sect without entering as a factor into the national life of either Galilee or Judea, and his death at Jerusalem did not cause a ripple in the history of the country; but for all that he may have existed and have been crucified. He may have played an important part in the events of the Nazarene sect, a small community of dissenters who were a branch of, or kin to, the Essenes known to Josephus and Pliny, and probably identical with the Ebionites, the Sect of the Poor. This possibility, which we deem quite probable, Professor Smith rejects as impossible, claiming that Josephus ought to have known something of the fate of Jesus.

The Gospel of Mark, in spite of the many additions which a mythological conception of the Messiah has introduced, appears to contain a foundation of real facts. There are too many features of

a personal nature and too many statements incompatible with the Messiah ideal which would not have been invented if the story were purely mythological as Professor Smith assumes. We cannot help assuming that the author was inspired by the belief in a real personality who lived in Galilee and died a martyr's death in Jerusalem. He may have his information second hand which accounts for the embellishment of miracle, and in addition to the Gospel of Mark we have indications of the historicity of Jesus in Pauline literature. Professor Smith may be right that the epistles of St. Paul are later compilations, but for all that we must assume that their nucleus was genuine, that Paul existed and though he did not know Jesus personally, he knew Peter, and he had heard of James, the brother of Christ. Professor Smith tries to explain this expression and other references to the family of Jesus by saying that the term brother was more a title of religious respect, and that in a certain sense all Christians were brothers of Christ, but I fear that his explanation can not be accepted, for the text does not allow such interpretation. These references in the New Testament to the family of Jesus are the more important as they stand in contradiction to the early dogma of the virgin birth of Jesus, and they were always a stumbling block to the Roman Catholic theologians who tried their best to weaken the force of these terms and to explain them away.

The editions of both Josephus and Tacitus contain passages on Jesus Christ, of which however those in Josephus have been rejected as later insertions. But the passage in Tacitus has scarcely been questioned, and Professor Smith is the first to throw the shadow of doubt upon this famous passage of the old truth-loving Roman historian.

We discuss the problem of the Gospels and kindred subjects in the current number of *The Open Court,* and will here only state that we are not inclined to doubt the historicity of Jesus. We accept the theory of the pre-Christian Christ, and believe that the features attributed to Christ have one by one been fixed upon the figure and inserted into the story of Jesus. The people of the age expected a Saviour who should accomplish certain things, should undergo certain sufferings, should teach certain doctrines, should fulfil the predictions of the prophets, and be distinguished by definite occurrences.

We assume that there was a certain Galilean by the name of Jesus, and that he was a leader in the sect of the Nazarenes. He was a mental healer who according to the current theory of the times

believed that diseases were due to demons, and so he cured his patients by exorcism. We may fairly well assume that he often succeeded, but the Gospels contain indications that he also met with disappointments. He had a contempt for the Gentiles and believed in the absolute divinity of the Jewish law even to the diacritical points of the Scriptures, but he hated its official representatives, the scribes and Pharisees, whom he called a generation of vipers.

When Saul of Tarsus became convinced that this Jesus was the Christ, the story of his life was seen in a new light and the notions of the Christ were woven into it.

One of the most palpable inventions in the life of the expected Saviour was the story of his persecution soon after his birth. Among the pre-Christian saviours from the Hindu Krishna, the Buddhist Gautama, the Persian Zoroaster, and the gods of Greek paganism, there is no one in whose life the newborn babe has not been persecuted by a wicked tyrant who feared to lose his throne on the advent of a new hero. The story of the massacre of the innocents is in all its main features identical with the slaughter of the babes in the myth of Krishna, and also in the legend of Buddha. In order to be proved to be the Christ, or the Saviour, or the Messiah, Jesus as a babe had to experience the same persecution and so this same story has been inserted into the Christian Gospels.

This we have granted, and Professor Smith has done much to corroborate the truth of the pre-Christian Christ ideal, but in our opinion he has not succeeded in proving the non-existence of Jesus of Galilee who lived approximately at the time to which Christianity assigns the life of Jesus. The Jesus of the Gospels must have been born a little earlier than the year one of our era, and his death is not merely based upon the authority of an obscure author but is well accredited through the Pauline epistles, and the correctness of the date as having taken place under Pontius Pilate can not easily be doubted.

The strongest evidence in favor of the historicity of Jesus, in our opinion, consists in the evidence we have in the statements of the Gospels, that the Jesus of the Gospels in many respects did not agree with the expectation of a universal Saviour. He was a Jew and believed in the narrowest conception of Judaism as appears from the anti-Gentile tendencies attributed to him in the New Testament, and he believed that the day of judgment when the son of man would come in the clouds of heaven was so near at hand that not all of his audience who were listening to him would die before all

should be fulfilled. Such passages which are either contradictory to fact or contradictory to the doctrines of the very earliest church would never have been written if the story of Jesus had been pure imagination. The church may have obliterated many kindred passages which contain statements no longer in harmony with its doctrines. That these traces were left in the Gospels is an indication of the genuineness of the traditions of the New Testament, and there are additional reasons which make it very improbable that the whole Gospel story of Jesus should have been pure fiction. There is no doubt that the Gospels contain mythical elements, but they are superadded and we find no reason to doubt the historical foundation of the story of Jesus.

Though we do not agree with Professor Smith we can not help thinking that his theory should be fully investigated, and that it is the duty of modern theologians to face the criticism squarely and to dispose of it in one way or another.

We wish to say here that Professor Smith proposes to have his book on the pre-Christian Jesus followed up by a new work, in which he would contrast the idea of the historical and therefore human Jesus with his conception of the origin of Christianity, according to which the hero of the Gospel story would be a humanized god, and so he would entitle his new work, not as Pilate said, *"Ecce homo"* but *"Ecce deus."*

EDITOR.

## PROFESSOR WILLIAM JAMES.

The unexpected death of Prof. William James has caused great grief in the wide circle of his friends, and we read the sad news with deep sorrow and sincere emotion. Professor James will be missed by friends and antagonists for with all his faults as a thinker he was a man of unusual genius, who by the very way in which he attacked the problems in which he was interested stirred the imagination and quickened the spirit of inquiry. Because of our personal acquaintance, I hesitated very long before I ventured to criticise him and I will say here that in spite of the attacks I made on his position we remained the best of friends and exchanged courteous letters. There is no need of repeating here the data of his life since they are too well known and have been sufficiently ventilated in the daily press.

EDITOR.

# BOOK REVIEWS AND NOTES.

GESCHICHTE DES MONISMUS. Von *Dr. Rudolf Eisler.* Leipsic: Alfred Kröner, 1910. Pp. 204. Price, 3 m.; bound 4 m.

The author wishes to serve the interests of both the supporters and antagonists of monism by thus presenting the history of a unitary world-conception. He speaks of monism in Greek antiquity with a short reference to Indian monism, the monism of the Middle Ages and the Renaissance, while the bulk of the book is devoted to monism in modern times. This part (pp. 32-173) is divided into (*a*) Monism in the 17th and 18th Centuries, and (*b*) Monism in the 19th Century. The latter is discussed under the heads of of (1) Idealistic Monism and (2) Realistic Monism. The fourth part contains an essay on "Idealistic Monism" which appears to represent the author's own views. On page 172 he asks the question, Is the universe a unit or a plurality? and answers that it is both at the same time. As a kind of appendix he offers his readers notes and addenda which contain quotations or summaries from monistic thinkers.

---

METHODOLOGISCHES UND PHILOSOPHISCHES ZUR ELEMENTAR-MATHEMATIC. Von *G. Mannoury.* Haarlem: P. Visser, 1909. Pp. 279.

This volume contains a course of lectures delivered by Prof. G. Mannoury of Amsterdam, Holland, on the foundation of mathematics. In the first part it discusses the foundations of arithmetic, and in the second part the foundations of geometry. The chapters of the first part treat (1) Unity and Multiplicity; (2) The Ideas of Number, Finiteness and Infinity; (3) The Characteristic Feature of Arithmetic; (4) The Generalization of the Idea of Number and the Principle of Permanence, and (5) Irrational Numbers, Magnitude and Number. The second part on the foundations of geometry discusses in four chapters: (1) Mathematical Logic; (2) Geometrography and the Straight Line; (3) Non-Euclidean Geometries; and (4) General Considerations of the Concept of Space. As its motto the book bears a dictum of Friedrich Nietzsche as follows: "The real material of all cognition are the most delicate sensations of pleasure and pain."

---

ELÉMENTS DE LA THÉORIE DES PROBABILITÉS. Par *Emile Borel.* Paris: Hermann, 1909. Pp. 190. Price 6 fr.

The theory of probabilities is coming more and more into use in connection with many questions of physics, biology and economics. Those who thus become interested in its application need to become acquainted with its methods in order to apply them to concrete questions, but are not interested in the mathematical questions upon which they are founded. It is for those people

who wish to apply the theory of probabilities to practical questions that these *Elements* have been written. The book can be understood from beginning to end by any reader familiar with the definition of the determinate integral and the concepts of algebra and geometry which this definition presupposes. The work is divided into three parts dealing respectively with Discontinuous Probabilities, Continuous Probabilities and Probabilities of Causes.

---

HERBERT SPENCER'S GRUNDLAGEN DER PHILOSOPHIE. Von *Dr. P. Häberlin.* Leipsic: Barth, 1908. Pp. 205. Price, 5.40 m.

In the author's opinion the world has been slow in recognizing the significance of Spencer, and his influence upon the thought of the present and the progress that has been made. He believes that this English philosopher (whom he calls the "philosopher of evolution") has been especially ignored in Germany, and in the present work he undertakes to offer a careful analysis and critique of the *First Principles.* Some of the chapters treat of the nature of philosophy and epistemological principles, so-called agnosticism and universal evolution.

---

OLD CRITICISM AND NEW PRAGMATISM. By *J. M. O'Sullivan.* Dublin: Gill, 1909.

Kant is here set forth as the exponent of the "old criticism," and after a wordy comparison of the treatment of the category of quantity by Kant and Hegel and a discussion of Kant's treatment of causation, the author finds it possible to arrive by the implications of these characteristic doctrines of Kant at the individualism and pluralism of pragmatism. He treats it as an epistemological method in its relation to criticism. Instead of finding pragmatism, however, a valuable method to substitute for Kant's critical system he finds that it grows increasingly inadequate and calls it a "confession of the futility of all logic."

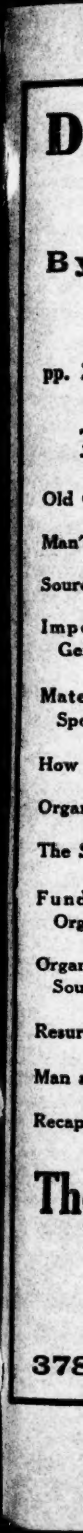
---

ABRISS DER GESCHICHTE DER PHILOSOPHIE. Von *Chr. Joh. Deter.* 9th ed. Berlin: Weber, 1910. Pp. 178. Price 3.20 m. Bound 4.20 m.

This very satisfactory summary of the history of philosophy has been revised and brought up to date in its ninth edition by Dr. Max Frischeisen-Köhler. An explanatory index serves as a concise philosophical dictionary, but lacks page references. A comprehensive list of names completes the volume.

---

"Jean-Jacques Rousseau, a Forerunner of Pragmatism," which Prof. Albert Schinz, of Bryn Mawr, contributed to *The Monist* of October 1909, has been published in pamphlet form by The Open Court Publishing Company. A number of typographical errors in the *Monist* article which inadvertently occurred through delayed proofs, are here corrected, and many passages have been otherwise revised and altered by the author. Three Appendices, "Rousseau and Condillac," "Rousseau and Madame de Genlis," and "An Unknown Phase of Rousseau's Thought," have been added to the original form of the essay and contain many interesting points. The "Unknown Phase" mentioned in the third appendix is the fact that "Rousseau seems to be in favor of pragmatic ignorance for the masses, while holding that for the select few, science is desirable and desirable in the interest of all."



# THE RELIGION OF SCIENCE LIBRARY.

**A Choice Collection of Well Made Books. Reproductions of Standard Treatises in the Departments of Philosophy, Psychology, Biology, Religion, etc.**

1 **The Religion of Science.**
Paul Carus. 30c. (1s. 6d.)

2 **Three Introductory Lectures on the Science of Thought.**
F. Max Müller. 30c. (1s. 6d.)

3 **Three Lectures on the Science of Language.** F. Max Müller. 30c. (3s. 6d.)

4 **The Diseases of Personality.**
Th. Ribot. 30c. (1s. 6d.)

5 **The Psychology of Attention.**
Th. Ribot. 30c. (1s. 6d.)

6 **The Psychic Life of Micro-Organisms.**
Alfred Binet. 30c. (1s. 6d.)

7 **The Nature of the State.**
Paul Carus. 20c. (9d.)

8 **On Double Consciousness.**
Alfred Binet. 20c. (9d.)

9 **Fundamental Problems.**
Paul Carus. 60c. (2s. 6d.)

10 **Diseases of the Will.**
Th. Ribot. 30c. (1s. 6d.)

11 **On the Origin of Language, The Logos Theory.** Ludwig Noiré. 20c. (1s. 6d.)

12 **The Free Trade Struggle in England.**
M. M. Trumbull. 30c. (1s. 6d.)

13 **Wheelbarrow; Articles and Discussions on the Labor Question.**
M. M. Trumbull. 40c. (2s.) (Out of print).

14 **The Gospel of Buddha.**
Paul Carus. 40c. (2s.)

15 **Primer of Philosophy.** Paul Carus. 30c(1s.6d.)

16 **On Memory, and The Specific Energies of the Nervous System.**
Ewald Hering. 20c. (9d.)

17 **The Redemption of the Brahman.**
30c. (1s. 6d.) (Out of print)

18 **An Examination of Weismannism**
George J. Romanes. 40c. (2s.)

19 **On Germinal Selection as a Source of Definite Variation.** August Weismann 30c. (1s. 6d.)

21 **Popular Scientific Lectures.**
Ernst Mach. 60c. (2s. 6d.)

22 **Ancient India; Its Language and Religions**
H. Oldenberg. 30c. (1s. 6d.)

23 **The Prophets of Israel.**
C. H. Cornill. 30c. (1s. 6d.)

24 **Homilies of Science.** Paul Carus. 40c. (2s.)

25 **Thoughts on Religion.**
G. J. Romanes. 60c. (2s. 6d.)

26 **Philosophy of Ancient India.**
Richard Garbe. 30c. (1s. 6d.)

27 **Martin Luther.**
Gustav Freytag. 30c. (1s. 6d.)

28 **English Secularism.**
George Jacob Holyoake. 30c. (1s. 6d.)

29 **On Orthogenesis and the Impotence of Natural Selection in Species-Formation.**
Th. Eimer. 30c. (1s. 6d.)

30 **Chinese Philosophy.**
Paul Carus. 30c. (1s. 6d.)

31 **The Lost Manuscript.**
Gustav Freytag. 80c. (3s.)

32 **A Mechanico - Physiological Theory of Organic Evolution.**
Carl von Nageli. Summary. 20c. (9d.)

33 **Chinese Fiction.**
Rev. George T. Candlin. 20c. (9d.)

34 **Mathematical Essays and Recreations.**
Herman Schubert. 30c. (1s. 6d.)

35 **The Ethical Problem.**
Paul Carus. 60c. (2s. 6d.)

36 **Buddhism and Its Christian Critics**
Paul Carus. 60c. (2s. 6d.)

37 **Psychology for Beginners.**
Hiram M. Stanley. 25c. (1s.) (Out of print)

38 **Discourse on the Method of Rightly Conducting the Reason and Seeking Truth in the Sciences.**
René Descartes. 30c. (1s. 6d.)

39 **The Dawn of a New Religious Era.**
Paul Carus. 20c. (9d.)

40 **Kant and Spencer.**
Paul Carus. 25c. (1s.)

41 **The Soul of Man.**
Paul Carus. 85c. (3s. 6d.)

42 **World's Congress Addresses**
C. C. Bonney. 20c. (9d.)

43 **The Gospel According to Darwin.**
Woods Hutchinson. 60c. (2s. 6d.)

44 **Whence and Whither.**
Paul Carus. 35c. (1s. 6d.)

45 **Enquiry Concerning the Human Understanding and Selections from a Treatise of Human Nature**
David Hume. Paper. 40c. (2s.)

46 **An Enquiry Concerning the Principles of Morals.**
David Hume. 30c. (1s. 6d.)

47 **The Psychology of Reasoning.**
Alfred Binet. 30c. (1s. 6d.)

48 **A Treatise Concerning the Principles of Human Knowledge.**
George Berkeley. 30c. (1s. 6d.)

49 **Three Dialogues Between Hylas and Philonous.**
George Berkeley. 30c. (1s. 6d.)

50 **Public Worship: A Study on the Psychology of Religion.**
John P. Hylan. 30c. (1s. 6d.)

51 **The Meditations and Selections from the Principles of René Descartes.**
Tr. by John Veitch. 40c. (2s.)

52 **Leibniz's Discourse on Metaphysics.**
Tr. by Geo. R. Montgomery. 60c. (2s. 6d.)

53 **Kant's Prolegomena.** Edited in English by Paul Carus. 60c. (2s. 6d.)

54 **St. Anselm: Proslogium, Monologium, an Appendix in Behalf of the Fool by Gaunilon; and Cur Deus Homo.**
Tr. by Sidney Norton Deane. 60c. (2s. 6d.)

55 **Canon of Reason and Virtue (Lao-Tze's Tao Teh King).**
Tr. by Paul Carus. 30c. (1s. 6d.)

56 **Ants and Some Other Insects.**
August Forel. 55c. (2s. 6d.)

57 **The Metaphysical System of Hobbes.**
Mary Whiton Calkins. 50c. (2s.)

58 **Locke's Essay Concerning Human Understanding.** Books II and IV (with omissions). Mary Whiton Calkins. 60c. (2s. 6d.)

59 **The Principles of Descartes' Philosophy.**
Benedictus De Spinoza. Paper. 40c. (2s.)

60 **The Vocation of Man.**
Johann Gottlieb Fichte. Paper. 30c. (1s.6d.)

61 **Aristotle on His Predecessors.**
Tr. by A. E. Taylor. 40c. (2s.)

62 **Spinoza's Short Treatise on God, Man and Human Welfare.** Tr. by Lydia Gillingham Robinson. 50c. (2s. 6d.)

*Sent postpaid to any address in the U. P. U. at prices quoted.*

**The Open Court Publishing Co., P. O. Drawer F., 378-388 Wabash Ave., Chicago**